METAL INDUSTRY

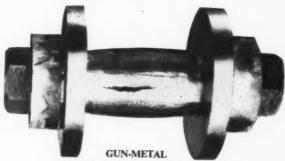
THE JOURNAL OF NON-FERROUS METALS

Remarkable performance of aluminium bronze...

0·10 IN. SHELL WITHSTANDS OVER 2 TONS PER SQ. IN.!

Recently we tested to destruction two similar hollow castings—one in gun-metal, the other in aluminium-bronze. The gun-metal had a wall thickness of 0.25 in. and withstood pressures up to 4480 lbs. p.s.i.—a very good performance. The casting in aluminium-bronze burst at a slightly higher pressure (4816 lbs. p.s.i.) but its wall thickness was only 0.10 in. Surely an impressive demonstration of the weight/strength characteristics of this alloy.

We were one of the first foundries to cast in aluminium-bronze and to-day we supply castings in this alloy to customers all over the world.



0.25 in. thick-burst at 4480 lbs. per sq. in.



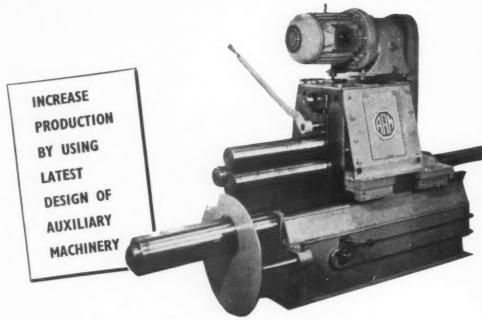
0.10 in. thick-burst at 4816 lbs. per sq. in.

T. M. BIRKETT, BILLINGTON & NEWTON LTD

HANLEY AND LONGPORT, STOKE-ON-TRENT, ENGLAND

Head Office: HANLEY, Phone: Stoke-on-Trent 22184/5/6/7. LONGPORT, Phone: Newcastle, Staffs 51433/4.

AUXILIARY ROLLING MACHINERY LTD-TIPTON 2617/18/19



(ARM)

3 Roll Uncoiler for opening the ends of tightly wound coils complete with pneumatically withdrawn head.

Capacity:

16" wide × 18"
thick Brass.

COIL OPENING MACHINE

Are You Equipped To Comply With Smokeless Zone Regulations?



Brass and other non-ferrous metals can be poured without offending either regulations or neighbours, and greatly to the benefit of operatives. Filters can be provided to effectively collect zinc oxide and other objectionable fumes instead of discharging them to atmosphere.

Sole Manufacturers

N E W T O N C O L L I N S

LIMITED

BRADFORD ST. WORKS, BIRMINGHAM 5

SPECIALISTS IN DUST AND FUME REMOVAL FOR OVER 35 YEARS "production of each job

from raw materials to

finished component is

under constant

supervision . . . "

Metallurgia



UNTIL we introduced and developed our new "die-line" technique, the accepted method of producing pressure die castings was by batch production. It involved handling, transit and storage between operations and the risk of damage to critical surfaces-particularly those intended for subsequent plating-was always present. It was uneconomical in floor space and made supervision difficult. All this has changed. The new die-line permits continuous production with all the finishing operations performed on a single conveyor line. Every operation is under constant supervision, and as no casting can touch another, impact damage has been eliminated. If you have a project where quantities are substantial, these facilities are at your service and your enquiries would be welcomed.

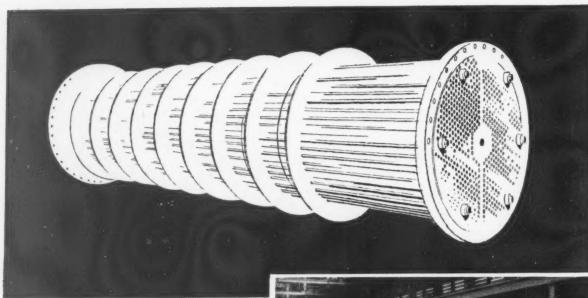
THE WOLVERHAMPTON DIE CASTING COMPANY LIMITED

GRAISELEY HILL WORKS

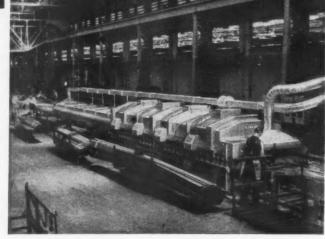
WOLVERHAMPTON

Telephone: 23831/6

SERCK TUBES AND G.W.B.



Above is an artist's impression of a large heat exchanger. The photo on the right shows a Driven Roller Hearth Electrically Heated Furnace supplied by G.W.B. Furnaces Limited to Serck Tubes Limited for annealing a variety of non-ferrous tubes including copper, cupro-nickel and aluminium/ brass with or without a protective atmosphere. A large percentage of these tubes is used in the manufacture of Heat Exchange equipment, designed and produced by Serck Radiators Limited, and serving a wide range of applications from oil and water coolers for small internal combustion engines up to large condensers and heat exchangers, such as the type illustrated, for the Petroleum, Marine and Atomic Energy Industries.



FURNACE CHARACTERISTICS: The furnace is designed to take tubes from 1" to 31" o.d. with lengths up to 35' 0".

OUTPUT: 2 tons per hour

RATING: 330 kWs in four independently controlled zones

TEMPERATURE RANGE: 650-750°C. normal

900°C. maximum

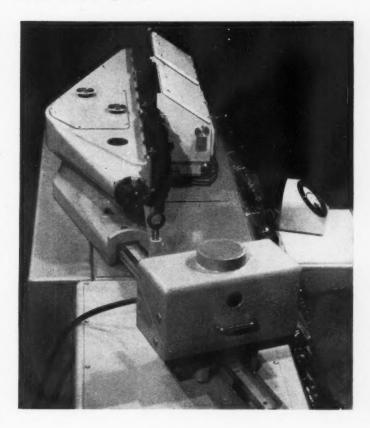
KWH CONSUMPTION: Aluminium/brass tubes 1"×14 s.w.g. annealed, consuming 88.25 kWhrs. per ton

Over 25 years' experience in electric furnace design at your disposal.



G.W.B. FURNACES LTD.

P.O. BOX 4, DIBDALE WORKS, DUDLEY, WORCS. Tel: Dudley 4284/5/6/7 & 5081/2/3/4/5 Associated with: Gibbons Bros. Ltd., and Wild-Barfield Electric Furnaces Ltd



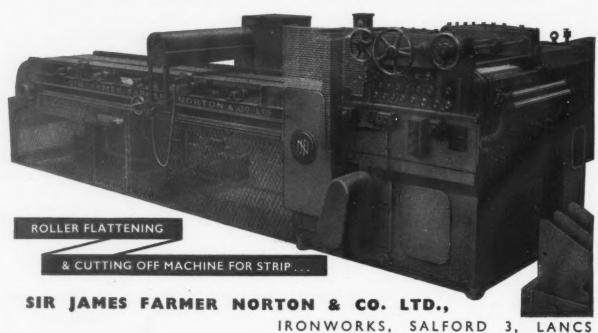
THE SECRET OF GOOD METAL

The secret of good metal is correct composition, which is most economically verified by rapid and accurate analysis. That is why more and more producers and fabricators of light alloys are turning to Hilger Medium direct readers for their analyses. They find that the cost of a direct reader is soon recovered from the money it saves, and know for certain that their alloys are up to specification. A complete analysis takes no more than two or three minutes and can be finished while the melt is still in the furnace.

The Triple Medium direct reader, shown in the illustration, can analyse as many as twenty-three different elements automatically, and can be used for photographic spectrography as well. It is described in Catalogue CH 405/b7 which gives accounts of all the Hilger direct readers.







1938 I.C.I. supplied John Date Ltd.
with a mechanised trichloroethylene
degreasing plant, to give cold liquor and
hot vapour treatment, for cleaning light
aluminium impact extruded containers.
Work baskets were fed through the plant
on a double chain conveyor (see illustration).



The old phase

One good plant sells another



The later plant in service

1957 I.C.I. supplied a second plant, similar to the first, but giving boiling liquor instead of cold liquor treatment. Heating is by a choice of steam or electricity. An interconnected still purifies the solvent. Baskets are now emptied and recharged in about 30 seconds. The hourly throughput is from 35-40 basket loads, each holding some 4 cu. ft. of containers.

IMPERIAL CHEMICAL INDUSTRIES LTD.,



LONDON, S.W.1.

DP.258

SUBMATIC

Barrel plating unit

Provides continuous output for zinc, cadmium, brass, copper and nickel plating.

Built up from separate barrel units each with individual drive. This gives great flexibility for varying outputs as the number of barrel units making up the plant can be easily increased or decreased as required.

We shall be pleased to give you full details and advice on request.

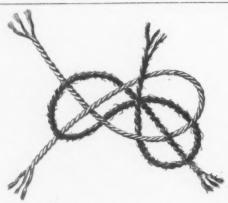
If you are interested in barrel plating, a

CANNING
SUBMATIC
is worthwhile looking into-straight

Manufacturers of everything for the polishing and plating industries.



BIRMINGHAM . LONDON . SHEFFIELD



if it seems a knotty design problem, even knottier to produce

call in the people with an unrivalled reputation for unravelling. Call in Camelinat for the design and production of complete units demanding specialists' experience in sheet metal fabrication and assembly.

Specialists in design and complete unit areduction.



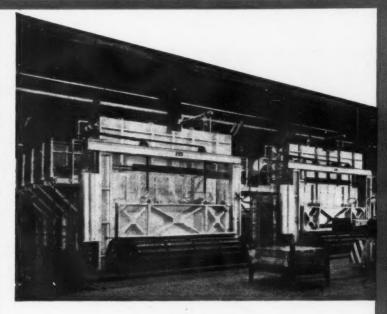
Camelinat

Member of the Owen Organisation

E. CAMELINAT & CO. LTD.,
CARVER STREET, BIRMINGHAM, 1
Phone: CENtral 6755 (5 lines)
Grams: Camelinat, B'ham.



ALUMINIUM







design and install

SLAB and BILLET HEATING FURNACES and

COIL ANNEALING FURNACES

in association with
Surface' Combustion Corporation of Toledo, Ohio



S

STEIN & ATKINSON LTD. LONDON

un brindis con un buen caldo!

(a drop of good stuff)

in Spain too
'A DROP
OF GOOD STUFF'
means SKLENAR melted

Whether it's Manzanilla or Manganese bronze, in Spain they appreciate 'a drop of good stuff'— and when it comes to melting, they and foundrymen the world over, rely on SKLENAR furnaces for top-quality results every time. For everywhere metal is processed, SKLENAR furnaces are recognised as the best by far. They give: — Higher output for less fuel—minimum metal loss—no costly crucibles needed—complete control of furnace atmosphere—easy access for skimming, alloying and refining—low heat-radiation ensures comfortable working conditions—adaptable for a wide range of ferrous and non-ferrous metals without fear of contamination—quantities from a few pounds to several tons—oil, gas or coke fired.

from a few pounds to several tons—oil, gas or coke fired.

SKLENAR FURNACES LIMITED

proc

50% higher output with REVERBALE melting and holding furnaces for the aluminium diecaster. Send for full details of these and the range of SKLENAR furnaces.* Prove their efficiency too, with 14 DAYS FREE TRIAL IN YOUR FOUNDRY.

*also the NEW SKLENAR
TAPPING VALVE for
continuous or intermittent ' tapping
off' of non-ferrous metals
up to 850°C.

385 NEWPORT ROAD CARDIFF • TEL: CARDIFF 45645 (PRIVATE EXCHANGE) • GRAMS: SKLENAR CARDIFF 45645

High Kurity NICKEL ANODES

AUTOFILTER · DEPOLARISED · ROLLED · CAST

76.º BETTER
ELECTRO—DEPOSITION

COPPER, BRASS, TIN' & CADMIUM ANODES

MANUFACTURED IN ROLLED, CAST & OVAL SECTION

SPECIAL ANGDES IN ANY METAL MADE TO

VANY SPECIFICATION OF FROM CUSTOMERS PATTERNS.

NICKEL ANODES & NON-FERREOUS CASTINGS &

BEACH WORKS · SHERBORNE STREET · BIRMINGHAM · 16

TELEPHONE - EDG. 1137. TELEGRAMS - ANODES. BHAM



Frankly, the purpose of this advertisement is to bring to your notice
that our prices for non-ferrous ingots of the highest quality
may well be a good deal cheaper than those you are already paying—
and our deliveries are exceptionally good, too. Then why the chap with the
camouflaged neck? Well, we rather thought that at first sight
you might be more interested in him than in us. But now we have come this far
together, may we send you particulars of our production facilities
and details of our very keen prices?

Write or telephone now to



METAL INDUSTRY

FOUNDED 1909

EDITOR: L. G. BERESFORD, B.Sc., F.I.M.

10 APRIL 1959 VOLUME 94 NUMBER 15

CONTENTS

						Pa
Editorial: Economic	Survey				* *	 2
Out of the Melting	Pot				4.2	 2
Mechanized Green S	and Found	iry. By	D. W.	Hand		 21
Gamma Radiography	y					 2
Protection and Packa						 2
Obituary						 2
Research Progress: A	Metallic and	I Non-A	Metallic 1	Bonding		 2
Copper Cables					* *	 29
Western American M	Aetals Con	gress			4	 25
Men and Metals					2.4	 29
Tinning Copper Wire	e					 29
Correspondence						 29
Industrial News	* *					 29
Forthcoming Meeting	gs		* *			 29
Metal Market News						 29
London						
Birmingham						
New York						
Toronto						
Non-Ferrous Metal I	Prices				2.1	 29
Scrap Metal Prices						
Domestic						 29
Foreign						 29
Financial News				* 4		 29
New Companies						 29
Trade Publications						 29
The Stock Exchange						 30

C Iliffe & Sons Ltd. 1959

Permission in writing from the Editor must first be obtained before letterpress or illustrations are reproduced from this journal. Brief abstracts or comments are allowed provided acknowledgment to this journal is given

PUBLISHED EVERY FRIDAY BY ILIFFE & SONS LIMITED

Editorial Offices: 9 Charlotte Street, Birmingham 3 . Telephone: Central 3206

Advertising and Publishing Offices: Dorset House, Stamford Street, London, S.E.1. Tel.: Waterloo 3333. 'Grams: "Metustry, Sedist, London"

Branch Offices: MANCHESTER: 260 DEANSGATE, 3; telephone, Blackfriars 4412 and Deansgate 3595.
BIRMINGHAM: KING EDWARD HOUSE, NEW STREET, 2; telephone, Midland 7191. COVENTRY:
8-10 CORPORATION STREET; telephone, Coventry 25210. GLASGOW: 268 RENFIELD STREET, C2; telephone, Central 1265

ANNUAL SUBSCRIPTION

HOME \$3 7s. 6d. OVERSEAS \$3 12s. 0d. CANADA AND U.S.A. \$10.00 INCLUDING ONE COPY OF METAL INDUSTRY HANDBOOK, PUBLISHED ANNUALLY

We have the answers to your corrosion problems at our finger tips



Protective zinc coatings may be applied inexpensively to steel by hot-dip or electro-galvanising, spraying or sherardizing. Zinc affords durable envelope protection by its high resistance to corrosion plus sacrificial protection to prevent rust at any bared areas.

DELAVILLE SUPERFINE ZINC DUST

For protective paints; the uniformity of particle size and absence of coarse particles give paints good appearance and perfection of finish. Zincrich paints can be applied as film with sufficient thickness to confer a high degree of protection when used as a one-coat shop primer.

ORR'S ZINC TETROXY CHROMATE

For incorporation in priming paints for steel and light alloys. The soluble chromate ions released in the presence of moisture suppress anodic corrosion. Since the chromate availability is both low and uniform, primers containing Z.T.C. have long and effective protective life.

ZINC DUST/ZINC OXIDE

Priming paints containing 80% of zinc dust and 20% of zinc oxide by weight produce a high performance corrosion inhibitor for industrial and marine environments. An advantage of this primer is that only a very limited surface preparation is necessary.

Visit us at stand nos. 48/49 at the Corrosion Exhibition and let us give you a helping hand in your fight against corrosion

METAL INDUSTRY

VOLUME 94

NUMBER 15

10 APRIL 1959

Economic Survey

Lower by one per cent in 1958 than in 1957, industrial production declined during the first three quarters of the year, being about 3 per cent lower in the third quarter than in the corresponding period of 1957. Production in the engineering and allied groups of industries as a whole showed little change from 1957 to 1958. In point of fact, a slight decline experienced in the general level of activity in that section of the engineering industries concerned primarily with capital goods was offset by an increase of 11 per cent in output of the motor industry to meet rising home demand for cars and increased exports. Output in the aircraft industry, which followed a continuous expansion since 1953, was also slightly lower, an increase of about one-third in exports being more than balanced by the loss of United Kingdom defence orders. Exports of iron and steel decreased by 12 per cent, this decrease accounting for about one-quarter of the total decrease in output, which was 10 per cent lower in 1958 than in 1957.

Like production, employment reached a peak in the third quarter of 1957 being, at the end of 1958, about one per cent lower than a year before; an improvement in the last quarter over the 2 per cent of the first three quarters. Although the increase in unemployment was spread throughout industry, the largest increases occurred in iron and steel, textiles and engineering. Worst hit was Northern Ireland, where the unemployment rate in December, 1958, was 8.5 per cent, compared with 7.6 per cent a year before, while Scotland and Wales remained the regions in Britain with the highest rates of unemployment.

The increase in production between the third and fourth quarters of 1958 had little effect on employment. Thus it would appear, says the Economic Survey 1959, that "output per man in industry fell slightly in the first three quarters of 1958 but rose in the last quarter. In 1958 as a whole, output per man in industry was a little higher than in 1957." Partly because total employment was lower, and partly because wage and salary increases were on average smaller, and were negotiated later in the year, the total of wage and salary payments was only 3 per cent higher in 1958 than in 1957, compared with a rise of 6 per cent in the previous year.

With a record current surplus in its balance of payments, with—for the first time since the war, and probably for many years before—a surplus on visible trade amounting to £120 million, and with the customary large surplus on invisible transactions, there is ample basis for the statement in the White Paper that "the United Kingdom economy is undoubtedly much stronger than in recent years." If demand and production continue to rise—as indeed the White Paper, working on the figures for the last quarter of 1958, confidently suggests they will—it is obvious that the economy can afford to expand more than in the past three years. It is, therefore, only to be expected that the Government's declared intention should be, "subject to the need to maintain a strong external position and the continuance of the recent record of price stability at home," to do all that it can to foster this expansion.

At the time of writing, the Chancellor of the Exchequer's Budget proposals are not known but it seems fairly certain that substantial Budget concessions will be the first means of giving effect to the Government's policy of expansion. Whatever these concessions may turn out to be—and someone is bound to be disappointed—it is certain that justification for them is better now than it has been for many years.

Out of the

MELTING

CINTERING of a powder in the True Picture presence of a liquid phase has hitherto received relatively little consideration so far as the kinetics of the process and the effect of the process variables are concerned. This matter has recently been attended to by W. D. Kingery, of the Massachusetts Institute of Technology, whose theoretical deductions and predictions were later satisfactorily confirmed by experimental results obtained from a study of sintering in the iron-copper system. For the theoretical consideration it is assumed that the liquid phase wets the solid and that the solid has a certain solubility in the liquid phase. When melting first occurs, the liquid phase formed will tend completely to coat the solid particles. Pores will be formed in the liquid phase, and the tendency towards a decrease in the pore surface area, and consequently in the overall surface energy, provides the driving force leading to densification. Three steps in this process of densification are distinguished. The first is the re-arrangement process: capillary pressure after the formation of the liquid phase tending to re-arrange the solid particles in such a way as to give maximum packing density and a minimum of resultant pore surface. Once this re-arrangement process has been completed, the densely packed solid particles, separated by thin liquid films, will be carrying the major part of the compressive stress (resulting from

the driving force mentioned above) at the contact points. The solubility at these contact points being slightly greater than the solubility of other solid surfaces, transfer of material from these points, with subsequent precipitation elsewhere, will occur, allowing the centre-to-centre distance between particles to diminish, and densification to take place. The initial rate of densification brought about by the solution-precipitation process may be determined either by the rate of diffusion of the material from the contact area or by the rate of phase boundary reaction. In the last stage of sintering, when a solid skeleton has been formed, the rate of shrinkage is sharply reduced to that

above picture of sintering in the presence of a liquid phase has been confirmed qualitatively and quantitatively by observations of the densification rate and microstructure changes during sintering of the iron-copper system. The densification as a result of the solution-precipitation process was found, in the case of this system, to be controlled by diffusion from the contact area.

obtaining in solid sintering under similar conditions. The

Seriously . . . OMPARED with metal-ceramic compositions, metal-plastics or, more broadly, metal - organic material compositions, have been given little attention, and certainly have received much less fundamental investigation. Like any other sweeping statement, the above must receive a measure of modification and limitation in order to take into account the few exceptions. These include the metal-containing paints, on which a good deal of research has been done in connection, for example, with "leafing" in the case of aluminium paints, and electrical conductivity in the case of zinc paints. Other exceptions are the organic-impregnated porous metal compositionsthe oil-impregnated and, more recently, the p.t.f.e.-impregnated bearings. Beyond these firmly established and reasonably well understood exceptions, one very soon finds

oneself, on pursuing metal-organic compositions further, in a field in which, contrary to everyday metallurgy, or, for that matter everyday plastics, there exist such products as plastic steel, metal cements, cold solders, and the like. All of these on closer examination are found to be metalplastics compositions of various kinds. They are likewise discovered to be able to serve various useful, though limited, purposes, and to possess certain useful, though usually exaggerated, properties. Having discovered all this, one is invariably left with a feeling that, in spite of the "obviousness" of metal-plastics compositions, their possibilities and potentialities have as yet by no means been adequately examined, let alone exploited. Progress in this field would presuppose the realization that such products must, and could, stand on their own instead of masquerading as metals or plastics, and that "powder" (and any old powder at that) is not the only form and the only means whereby a metal can be incorporated in plastics. With structure so much to the fore where plastics are concerned, a little more consideration given to the morphology of their metallic partners would not seem to be asking too much.

17HAT with adhesion, sticking and

Disputed

slipping, the transfer of material, the possibility of melting as a result of the heat generated, the radioactive isotopes introduced to measure the amount of material transferred, and the oxidation, etc., of the debris, it is hardly surprising that the exact nature of what happens between two sliding surfaces still remains uncertain. The use of radioactive tracers has made possible a quantitative determination of the amount of metal, e.g. copper, transferred from a slider to a stationary steel surface. On the basis of the "adhesion theory" of friction, it is assumed that as a result of this adhesion, the weaker material of the two relatively-moving solids breaks, the fragments remaining attached to the stronger solid. The friction is considered to be equal to the product of the shear strength of the weaker solid and of the area along which rupture takes place. When a radioactive slider is used, the area over which adhesion and rupture has taken place can be evaluated from photographs of the track. This area will be some fraction of the geometrical area of contact and of the track. Considerable doubt on this adhesion theory of friction has now been cast by rough calculations based on the amount of metal (copper) actually transferred, and taking into account the total relative elongation of copper of about 0.5 per cent which will occur in each case before a contact is ruptured. According to this view, a very large number of successive, closely-spaced contacts is formed and ruptured. evaluation of the force and the energy involved in rupturing these contacts for the amount of copper actually transferred to the steel surface indicates that only a very small proportion of the frictional force can be accounted for by the metal transfer. In other words, 99.98 per cent of the frictional force is not due to adhesion and must be caused by: a combination of the viscosity of the medium and the surface roughness, sur-

face roughness alone, an elastic deformation of the solids, or their elastic and plastic defor-



Mechanized Green Sand Foundry

By D. W. HAND

ITH the object of increasing production while at the same time reducing costs, and to eliminate most of the manual work which is so prevalent in the typical non-ferrous jobbing foundry, a modern mechanized foundry has recently been installed at the West Bromwich works of the Sandwell Casting Co. increase of over 35 per cent in production has already been obtained. A general view of the foundry is shown at the head of this page.

The sand being used is a Bromsgrove-based naturally-bonded sand having a moisture content of 4-3 per cent and a green strength of approximately 7 lb/in2. As a continuous sand milling system is employed, sand tests are made at regular intervals throughout the day. Small additions of red sand are made to the system to compensate for that which is lost due to the adhesion of sand to the castings when they are removed from the foundry for fettling. Very small addi-tions of clay are also made from time to time in order to maintain the green strength and plasticity of the sand. These additions are made through a special grid which is situated over an independently controlled underground belt, which feeds the addition very slowly on to the main return belt.

The main return belt carries these additions, together with used sand from the floor moulding department and used and spillage sand from the mechanized foundry, under a magnet which removes all core wires, etc., and then on to a bucket type elevator.

There, the sand is raised to the top of the main storage hopper, which has a capacity of 30 tons of sand. Before entering the hopper, the sand is passed through a rotary screen, which rejects all pieces of metal and broken cores which find their way into the sand at the knock-out station.

The sand is fed into the mill by means of a 7 ft. diameter distribution disc, which slowly rotates at the base of the hopper, a plough guiding the sand off the disc into the mill.

The mill itself consists essentially of a revolving pan, together with a large number of scrapers and diverters. Three spring-loaded, free rotating mullers are fitted which, by their skidding action, cause the grains of sand to rub together, so creating a bond with the additions made at the new sand hopper. The diverters and ploughs aerate and cool the sand, while

gradual spiral towards the centre of the pan, where it is discharged. Moisture is added to the sand by three sprays, directed on to the mullers, which has the effect of presenting a thin film of water to the sand being mixed, so ensuring a uniform addition.

After leaving the mill, the sand is raised in another bucket elevator to a disintegrator. Here, the sand is thoroughly aerated in order to obtain a consistent texture. This is achieved by allowing the sand to feed into the



centre of a ring of steel pins which are revolving at very high speed. The sand falls through this ring of pins, whereupon it meets a similar ring running concentrically in the opposite direction, and by this whirling action a smooth, thoroughly aerated sand is produced. The sand is prevented from clogging by a jolting mechanism which is fitted to the casing of the disintegrator.

The sand is now conveyed along the overhead feed belt, some 17 ft. above the ground. From this belt the sand can be drawn off either into one of the hoppers situated above each of the four moulding machines, or into a large hopper which is used to store sand for the floor moulding depart-

ment.

Electronically-operated ploughs guide the sand into the hoppers, being actuated by two probes set inside the hoppers which come into operation according to the level of the sand, the filling of the hoppers, therefore, being made fully automatic.

There are four moulding machines, although the plant has been con-

structed to allow for the installation of two further machines in the future. The machines are pneumaticallyoperated going through an automatic jolt-squeeze-strip cycle. The moulding box is placed on the table of the machine on which the pattern plate is mounted, and sand is then fed from the hopper, the pneumatically-operated jaws of the hopper being set in motion by a valve operated by the moulder's knee. On pressing the starter button, the machine gives the mould a predetermined number of jolts, the head swings into position and a squeeze pressure is applied. The table then draws down, the head swings away, and four pins engage the underside of the moulding box and strip the mould from the pattern. The initial stroke is slow and comes into operation with a pre-timed vibrator, and is followed by a fast movement which raises the box clear of the table.

The moulds are transferred by hand on to a roller conveyor, where the cores are laid and the moulds closed. Once sufficient moulds have been made to take a pot of metal, they are transferred to the powered pallet conveyor, which slowly carries the moulds to the pouring bay. The moulds are cast on the conveyor and, after casting, continue on to the knock-out station. The speed of the conveyor is variable, and can be adjusted so as to allow sufficient time for the metal to solidify completely and yet be hot enough to enable the castings to be knocked off the sprues.

At the knock-out station, the moulds are pushed off the conveyor on to the vibratory knock-out grid by a pneumatic pusher. This unit, working at 80-100 lb/in² air pressure, consists essentially of a heavy duty, double-acting air cylinder which is controlled by a hand valve situated in a convenient position at the side of the

knock-out.

The vibratory knock-out effectively breaks down the mould, the sand falling through a chute on to the main underground return belt, and so on to the main storage hopper. A gravity

feed roller conveyor transports the

empty boxes back to the moulding machines.

Gamma Radiography

NE of the chief features of gamma radiography is the fact that the small gamma source can be brought to practically any required exposure position, but this advantage can only be fully exploited by means of equipment which will enable a remotely-controlled exposure of the source, the operator remaining at a

safe distance while source positioning is being carried out.

An improved gamma radiographic container and remote control now enables a source to be moved out of its shielding container, along guide tubes, or alternatively, allows a cone of radia-

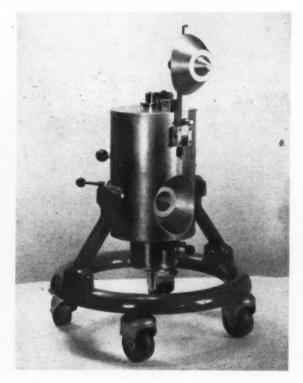
tion to be emitted in cases where it is not required to take advantage of the omnidirectional radiation emitted by the source.

This unit has been introduced by Nuclear Engineering Ltd., of Woolwich road, London, S.E.7.

Left: The gamma ray unit ready for attachment of guide tubes to the exit port for complete source extraction

Right: The unit opened to produce the conical radiation field





Protection and Packaging of Non-Ferrous Metals

(Continued from METAL INDUSTRY, 3 April, 1959)

ONTINUING the report of the informal discussion on "The Economic Protection and Packaging of Non-Ferrous Metals in Storage and Transit," we publish here contributions by Mr. H. Hodges, of Henry Wiggin and Co. Ltd., and Mr. S. G. Rydings, of the British Transport Commission. The discussion, which was organized by the Institute of Metals, was held at the College of Technology, Birmingham, the chair being taken by Professor H. Ford.

DISCUSSION

H. Hodges (Henry Wiggin and Co.

Shortly after the end of the last war, my company, being dissatisfied with the methods we had adopted for packing, set up a packaging committee—of which I, as a member of our technical sales department, was appointed chairman-recognizing from the very beginning that packing was a co-ordinated operation which involved not only production and warehousing, but also selling. I am indebted to F. M. Peebles, our packaging manager, another member of that committee, for most of the comments and information which follow.

We manufacture more than 50 alloys based on nickel, which are sold in forms ranging from fine wire to large diameter bar, and it is obvious that the storage and packing of such a variety of forms calls for many different alloys

treatments.

Before we consider the method of packing to be adopted, we must ensure that the material itself is in perfect condition before enclosing in the pack. may be necessary to store the product for a time before packing, so we must examine the steps necessary to keep the product free from contamination damage in store.

Nickel and high nickel-base alloys require protection from contamination arising from manufacturing conditions such as grease, lubricants, and atmospheric pollution. Most of the alloys are going to be used in corrosive environments or to be welded, and the presence of contaminants and films on the surfaces can have a detrimental effect on their welding response or on their future per-

formance in a corrosive environment. The use of high sulphur-bearing fuels has to be avoided, and sulphur-bearing lubricants, used on rolling mills, for the drawing of wire and tubes or for machining, must be removed before reheating or welding. Obviously, therefore, the presence of these during the packing operation or in the warehouse must be avoided.

Nickel is more susceptible than its alloys to contamination by heavily pol-luted industrial atmospheres. The nickelchromium alloys are much less susceptible than pure nickel, and the nickel-copper alloys are intermediate in their suscep-The nickel-iron alloys are fairly resistant to industrial pollution, but they rust in damp atmospheres. Furthermore, the nickel-iron alloys are often used in applications where the surface must be exceptionally clean. Nickel strip and tube for electronic uses must have n high standard of surface finish and cleanliness.

The extent to which the alloys can be polluted in an atmosphere such as that which exists in Birmingham can

extremely serious.

Nickel itself is soft and easily scratched. Nickel-copper alloys are fairly soft, and on the nickel-iron alloys which may be used to make glass to metal seals, mechanical damage of any kind to the surface cannot be tolerated. Scratches and mechanical damage may later initiate local corrosion on all metals.

Since nickel alloys have a greater value than steel, the workpeople must be trained to handle these materials with special care. In the final processing of sheet, clean cotton gloves should be worn by operators, inspectors and packers. We take the precaution of interleaving sheet ware always sold first.

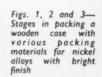
and strip with cardboard squares during the various handling processes, to avoid scratching, and this is replaced by tissue interleaving paper in the final pack. Strip in coil form is automatically interleaved during final inspection and this has avoided a number of problems due to scratching. Coils are afterwards automatically wrapped overall in crepe paper, which not only protects against scratches excludes dust and atmospheric pollution.

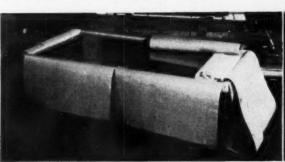
Operators should be discouraged at all times from unnecessary handling, so as to avoid stains from perspiration in

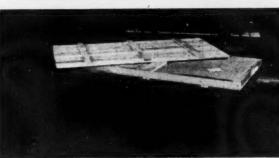
storage.

If we are to consider economic storage in the full meaning of the term, then we must follow the "first in, first out" principle, so as to keep the shelf life of the product as low as possible.

A simple system now being popularized is the sloping roller track bin, where, if the product was jars of jam, the new stock is pushed in the rear or high end, and the sales are made from the front or low end. That, of course, has its limitations in industry, having regard to the variety of tracks required or to the quantity required We have devised a to be in the pipeline. somewhat similar method for the storage of nickel alloy wires on reels, which are packed in baskets or peg trays. The nett packed in baskets or peg trays. weight of materials per container is set out on a ticket, prepared in duplicate, to which is added the bin location. One ticket is fixed in the container; the other goes to stock control office. Here it is goes to stock control office. Here it is inserted at the rear of like tickets for that quality and gauge. Sales are, of course, made from the container shown on the front one of the tickets, so that the oldest are always sold first. The two further









advantages of this system are, first, that stocktaking is simplified, as undisturbed baskets can be calculated from the office, paskets can be calculated from the office, only those having had small sales requiring rechecking; and, secondly, there is no need to reserve a rack for each quality or trade name of wire; each rack can be filled to completion by any container, so no racking is wasted.

There are certain general considerations.

There are certain general considera-tions which apply equally to any supplier of metal goods. The packing manager should be familiar with the use to which the product is to be put, so that special precautions may be taken when necessary. The most economic packaging is that which ensures the goods arriving safely which ensures the goods arriving sately at their destination; if the pack arrives undamaged but the goods inside are damaged, then the packing is unsatisfactory; if the goods arrive safely but the case is damaged, then the packing principle is sound but the materials used for packing are faulty; if both goods and packing are damaged, then the design of

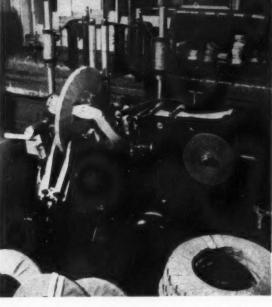


Right: Fig. 5—The Larmuth machine for wrapping strip in coil

the package is at fault. We do not believe in sending out packages which say "This way up." You must make a case which

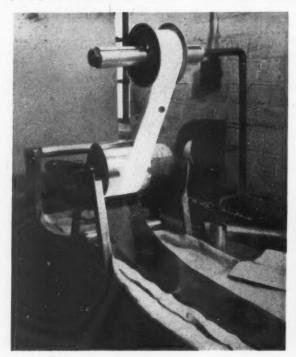
way up.

We have paid a great deal of attention to the design of labels, tags and other means of identification to ensure that the goods arrive bearing the information which the customer requires. We frequently have to convey a great deal of information; for example, trade name, customer's order number, works reference customer's order number, works reference number, specification, weights, dimen-sions, melt or cast number. I mentioned earlier how important it was to know the end use of the product.

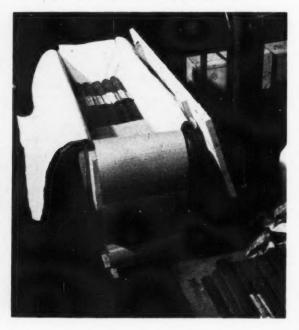


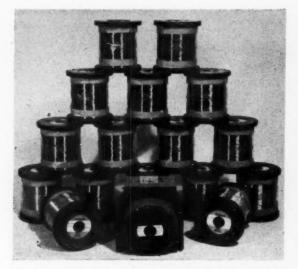
As an example, Inconel strip required for automatic argon-arc welded tube, where the edges must be free from damage, might very easily be wrapped in crepe or other paper for protection. In fact, this was the method we originally adopted. Experience has shown that the slightest chafing in transit leaves paper dust on the edges of the strip, sufficient to produce a flash in the welding and to spoil the weld. The answer here was to exclude all paper, corrugated and wood wool from the pack

With regard to moisture from wood, we find that oak, sweet chestnut and cedar are all unsatisfactory, giving off excess amounts of moisture. We line excess amounts of moisture.



Left: Fig. 6—Interleaving cold rolled strip with tissue paper Below: Fig. 7—Cut straight lengths being packed for export





cases for export with pitch paper so as to form an envelope.

Where nickel-iron alloys are being packed, strips of vapour phase inhibitor paper should be enclosed to reduce the effects of condensation.

If the package is to be subject to tropical conditions, special precautions must be taken. Tropical packaging is a subject on its own and it is essential that all concerned with packing should be fully familiar with the methods required, and it is recommended that the appropriate sections of B.S.1133 issued by the Institute of Packaging should be always to hand.

to hand.

We believe considerable economy can be effected by the use of stacker-trucks and palletization, and are introducing these wherever possible. We believe that large economies could be effected if non-returnable cases, drums, reels, etc., could be devised and used on a larger scale, thus avoiding much correspondence and clerical work.

Above left : Fig. 8— Plastics reels for packing wire

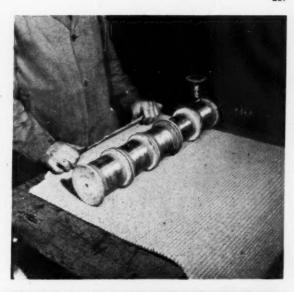
Above right: Fig. 9— Wooden reels being wound in a tube with corrugated paper

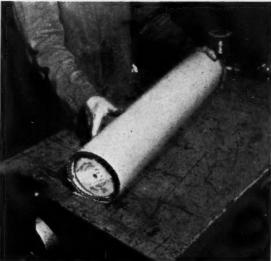
Right: Fig. 10—Tube comprising 4 wraps of corrugated paper

Below left: Fig. 11— Packing tubes of reels in container

Below right: Fig. 12— Ultra-fine wire on plastics reels for packing in dustproof containers















of cut straight lengths in nickel-iron alloy is illustrated in Fig. 7.

One of the first jobs of the packing committee was to examine our reel prob-lem in the packing of wire. We use about 100,000 to 200,000 wooden reels every year for the packing of wire—new ones. At that time wooden reels were very expensive and in short supply, also, because the wood was not seasoned, we were receiving a lot of complaints from customers that wire was loose on reels. We did not like wood at all. The situation is a bit better now, the supply is easier, but we still do not like wood. We started looking into plastics reels for the packing of wire. The first ones we packing of wire. The first ones we examined were rather easily damaged, and were expensive. But we are now using a type of plastics reel (Fig. 8) which can make at least three times as many journeys as a wooden reel. Although it is little more expensive than a wooden reel, it has the advantage that we can stamp the weight of the reel on instead of having to weigh a wooden reel every time, since it does not change in weight. Altogether we find it a very attractive proposition, and we are changing whenever possible from wooden to plastics reels

The reels shown in Fig. 9 are wooden ones. One of the biggest problems with wire products is to get a satisfactory method of wrapping for export. We are continually receiving complaints that the wire has shifted in transport. One method adopted is illustrated in Fig. 9, where we take these wooden reels and wind them up in a tube with corrugated paper. Then, as shown in Fig. 10, we do four wraps of this until they are all bundled together in a tube. It is not very subtle, but very effective. These are then placed in a container with corrugated paper to prevent movement (Fig. 11).

We would like to deliver reels on pallets to local customers, but that does involve quite a lot of capital expenditure in providing the pallets and the peg trays. It certainly would not be suitable for the export business.

The packing of very ultra-fine wire on plastics reels, which are then put in a dustproof plastics container, is shown in

Figs. 13, 14 and 15— Warehousing methods. In Fig. 14 the reels are being weighed, and labelled on an automatic printing machine

Cold rolled annealed or cold rolled hard sheet bright finish in nickel, Monel, Inconel or any of the Nimonic or Nilo series of alloys are packed as in Figs. 1-3. Thus, Fig. 1 shows a wooden case laid on a truck and the various packing materials in position. These consist of, first, waterproof paper, then corrugated strawboard which holds it in position, and interleaving tissue paper which prevents scratches between sheets. Fig. 2 shows how the interleaving paper is placed between each sheet, and Fig. 3 shows the pack ready for closing and despatching.

A method which has proved very satisfactory for packing Nilo 475 (a nickel-chromium-iron alloy) cold rolled annealed strip is illustrated in Fig. 4. It is enveloped in a special protective plastics wrapping, the edges sealed with an electric iron, and the pack is completely resistant to moisture. It appears to be an expensive form of packing but, in fact,

it is not particularly so. It has another advantage, namely, that the strip can be removed from the packing, inspected by the inspector at any time, and can be put back and re-sealed. It can be kept on the shelf more or less indefinitely in this condition.

A Larmuth machine, used for wrapping nickel or Monel cold rolled strip, is shown in Fig. 5; it does an excellent job except when we cannot use paper, and makes a solid, sound pack for any strip required in coil form.

The interleaving of cold rolled strip with tissue paper to prevent damage during handling is shown in Fig. 6. It will be noted that the tissue paper is not the full width of the strip because it is difficult to feed it in so accurately that it does not get into a tangle. With a narrower tissue paper a good deal of protection is still provided and no trouble is experienced with feeding.

A method used for the export packing

Fig. 12. It is a very satisfactory method for wire below, say, 0.001 in. diameter down to, say, 0.0005 in. diameter.

The method of warehousing which we recently intended in the control of the control

recently introduced is illustrated in Figs. 13-15. The reels are weighed and labelled on an automatic printing machine (Fig. 14). We now print all our labels;

we no longer write them out by hand.

The method by which the peg trays can be removed and used as required is

shown in Fig. 15.

S. G. Rydings (British Transport Commission):

The subject is "economic protection," and I think the operative word here is economic. In this connection, I do not make any apology at all for repeating certain comments. I was on a committee of the Engineering Equipment Users' Association, and we have just completed the issue of a handbook called "Protection and Storage in Transit."

First, there is no virtue in making goods unless they are used. If they are not packed adequately they will be extremely lucky if they arrive at their destination in

a usable condition.

It is appreciated that next to the condition of the goods on arrival, cost is the most important factor, but every care should be taken to see that it never becomes the first consideration, because if so the standard of packaging is almost

bound to suffer.

Manufacturers of any commodity would not be in business if they were not interested in the financial benefits they were likely to obtain, and it is apparent that the cheaper the packaging the lower the cost of the article will be. Low cost packaging is ideal, provided-and this is the important point—that it is adequate for the job for which it is intended: that is, to get the goods to the user in good and, if necessary, pleasing condition. Unnecessary expense in packaging will result in a non-competitive price due to high production costs, but supplying inadequate packaging is, in the long run, as shortsighted a policy as using inferior materials in the manufacture of the goods themselves.

This may, of course, be qualified in certain respects where packaging for impulse buying or the purely eye-catching appeal is being catered for, but I hardly think this factor enters into the packaging generally of non-ferrous metals.

Whatever problems do arise, they will arise in regard to the home market, and probably in a slightly lesser degree in the export market. The answer to one is bound to assist in answering the other. The basic causes of damage must be

due to one or a combination of the following factors:-first, packing materials not right for the job; secondly, inadequate or inefficient protective treatment before packing; thirdly, handling in transit;

conditions of storage.

Dealing first with the correct packing, obviously each case must be treated as an individual problem. There can be an individual problem. There can be no general answer to packaging for every type of commodity. It depends on the nature of the goods to be packed; their value (that is one very important factor); fragility; other susceptibilities to hazards of transport or storage; form of transport and type of storage; and, finally, the economic considerations and whether the pack is only to protect what it sells or also to sell what it protects.

There can be no single answer to these problems, but there are certain funda-

mentals; in the first place, a pack of whatever kind must be made of the best quality materials consistent with economic considerations; secondly, there must be some form of basic standard to which one can work which at least will give some yardstick. In some cases it may be necessary to have qualities which are slightly above the basic standard, and in other cases slightly lower, but even then the packaging materials must still be of best quality, although lower in fication. Thirdly, there must be specification. efficient securing and sealing or closure.

How these principles are applied can only be related to individual instances. For example, in the Railway Clearing House we have roughly 100 to 150 separate and distinct types of pack coming in every week for examination and testing.

and testing.

Protective treatment is of particular importance in relation to export, when one must have a greater regard to the conditions under which the cases or materials are likely to be handled and transported at destination, together with the climatic conditions likely to be present at the time of receipt. It is also of considerable importance in some instances for home products.

Corrosion or deterioration arises when metal surface is exposed to moisture either by direct wetting or by condensa-tion. Even in this country in high summer temperature there can be a con-siderable amount of water vapour present which can condense with a fall in temperature.

At this stage comes the question of anti-corrosion treatment. One of the most important methods is cleaning the it is packed and then product before applying suitable corrosion preventives. ranging from coatings or dippings of resins, greases, oils, to the strippable plastics coatings, cocooning, and the use of vapour phase inhibitors.

I did refer to the use of standard quality materials in the outer case. This has its impact on the corrosion problem. One speaker has already mentioned oak and red cedar, and other types of wood which are bad. It does also arise in cases made of fibreboard or the paper pulp products. If they are made of good quality material they have a very good water resistance. If they are of bad material they have very poor

resistance.

The next stage is handling. The first consideration is the type of transport, whether it be by rail, by road, by air, by sea, or by river; the second is the loading and despatch factor; if it is rail transport, whether it is going in full loads—full truck loads or full container loads—or even palletized loads, or whether they are individual packs requiring the maximum degree of manual handling or trans-shipment en route. Thirdly, the size and weight of the individual units requiring movement; fourthly, in full van or truck loading, the effective securing within the vehicle and the efficient sheeting or pro-tection against wet. Of course, those are factors which apply principally to the people who load, but there are cases where it is of importance to people who are loading in private sidings, or loading on trucks themselves.

Finally, there is the storage question: the length of storage, the actual physical conditions of storage from the aspect of humidity, and the handling equipment

I should like to emphasize from our

point of view, in regard to aluminium sheets, the necessity for 100 per cent cleanliness in the firms' workshops and packing line. I was very interested to hear of the inspection and packaging in one operation. We have had cases where a little carelessness in the packing, particularly with highly finished material, slight dust and not a very great amount of vibrational movement in transit, can create very serious difficulty. Also, so far as wood packaging is concerned, it is very important to see that chestnut, oak or cedar is not used if anything else is available. If you have to use them, increase the method of water repellent protection. The wooden cases must be dry, and they must be stored in a reasonably dry atmosphere before packing. About 18 per cent is the usual water quantity, but the degree of absorption in wood is remarkable. It is a very important

From our point of view, one factor to which sufficient attention is not paid is that of nailing. We get quite a lot of cases where the weight of the contents is far too great for the size, the quality, or the method of nailing. I would stress the method of nailing. I would stress this point, particularly in connection with unseasoned wood or wood which is slightly damp. On the wood drying, the nails are not going to do a very good job.

I would certainly recommend cementcoated and sufficient length and size of nail for the dimensions, size and thickness

With metal strapping, it is necessary to use sufficiently strong strapping, although it is like the chain, the weakest link is the seal, but the size of the seal increases in proportion to the size of the strapping. That is a factobe closely borne in mind. That is a factor which should

be closely borne in mind.

One of the factors with aluminium sheets is tight packing; the tighter the packaging the less the impact of even slight vibration on the interior. If there is slight looseness inside, the problem of vibration is immediately set up.

(To be continued)

Obituary

of the timber.

Mr. G. A. Adams

WE regret to record the death of Mr. G. A. Adams, sales manager, Engineering Services Division of Geo. Salter and Co. Ltd., West Bromwich. Mr. Adams had been with the company for many years and was well known throughout the engineering industry.

Sir Ashley S. Ward

WE also regret to record the death of VV Sir Ashley S. Ward, LL.D., President of Thos W. Ward Ltd., Albion Works, Sheffield, chairman of the Park Gate Iron and Steel Co. Ltd., Rotherham, vice-chairman of Laycock Engineering Co. Ltd., Sheffield, and a local director of the National Provincial Bank Ltd.

A nephew of Thomas W. Ward, the founder, he joined the firm as a young man. He was afterwards sent to London and subsequently established the extensive Silvertown Works. He became successively assistant managing director, joint managing director, and in 1941 was appointed chairman and managing director.

Research Progress

Metallic and Non-Metallic Bonding

BY RECORDER

THE carbides of transition metals have long been regarded as ideal material for machining tool tips and extrusion dies because of their high melting points and consequent strength and hardness at elevated operating temperatures. It is not surprising, therefore, that these materials and the analogous silicides and borides should now be considered as potential candidates for gas-turbine applications.

A serious drawback, however, is the inherent brittleness of the pure compounds. This has largely been overcome with the carbides by the addition of suitable bonding metals, but similar developments with the silicides and borides are in a less advanced state. The potential value of these high-temperature materials is so great that no avenue should be ignored in their

development.

So far the attack has been mainly along the lines of cementation to produce, at best, a multi-phase alloy of hard constituents in a more ductile metallic matrix. It would seem that a more basic approach is necessary, and in this connection the Paper by Robins¹ on "Bonding in Carbides, Silicides and Borides" is of particular interest and deserves serious consideration.

Bonding Theory

A general thesis is offered that properties of the transition metals, of their alloys and of their compounds, can be related to the co-ordination and number of bonding electrons of the metal atoms. Thus, for the transition metals, for which the number of hybrid bonding orbitals of comparable energies is large, it is suggested that the strength of bonding is dependent upon the electron concentration N and effective co-ordination of the atoms C, the maximum stability occurring when the number of bonding electrons per atom is about half the effective co-ordination number. Alloying affects both N and C, and when, for example, titanium (Group IVA) having four bonding electrons is alloyed with vanadium (Group VA) having five bonding electrons, the average value of N is increased. Further, due to a large difference in atomic diameters, the crystal structure is distorted and C is also affected.

For metals with effective co-ordination number 12, the optimum number of bonding electrons per atom is six, corresponding to metals of Group VIA. Metals of Groups IVA and VA should, therefore, be electron acceptors and should combine strongly with electron donors such as cafbon, boron and silicon. The diameter of the carbon

atom is such that it can be accommodated interstitially in the crystal lattice so that direct metal-metal bonds are Thus, the mono-carbides possible. titanium, vanadium, zirconium, niobium, hafnium and tantalum all have the NaCl-type of structure, which may be regarded as two interpenetrating face-centred cubic lattices. It would seem that, in these compounds, the ideal state exists of a homogeneous mixture of metallic and non-metallic bonding right down to the atomic scale, and that with appropriate combinations it may be possible to produce any desired range of properties from that of a ductile metal to a brittle compound.

Robins, however, is of the opinion that the metal-metal bonding is the more important in determining the stability and crystal structure of the carbides. The distorted hexagonal close-packed crystal structures of Group IVA elements (i.e. axial ratio<1.633) is attributed to the tendency of the metal atoms, of valency four, to reduce their effective coordination number to less than twelve.

Carbides

Only a limited amount of carbon can be taken into solution since the carbon donates electrons to the metal, increasing its valency, and the metal changes its phase to the face-centred cubic structure with co-ordination number twelve. The NaCl-type crystal structure of titanium carbide is thus regarded as a new metal phase stabilized by the presence of carbon.

The metal-carbon bonding must, as Robins himself points out, contribute to the stability of the carbide. If the only role of the carbon atoms were to increase the effective valency of the metal atoms, then the Group IVA mono-carbides would be expected to have melting points comparable with those of the Group VA elements, but the melting points of the carbides are

appreciably higher.

It is claimed that the same considerations apply to Group VA metal carbides, although it would be expected that these carbides would have higher melting points than those of Group IVA metals, which is not the case. Since the highest melting point carbides are the double carbides, with about 80 per cent tantalum carbide and 20 per cent of zirconium or hafnium carbides,² it is suggested that the optimum number of bonding electrons for a co-ordination number of twelve between the metal atoms in the face-centred cubic mono-carbide is a little less than six.

Coming now to the carbides of the

metals of Group VI, Robins found it not possible to apply his treatment to chromium carbide, although the monocarbides of molybdenum and tungsten fitted satisfactorily into the general picture. The structure of the latter carbides is hexagonal but, like the face-centred cubic structures of the other carbides, has a co-ordination number 12 for the metal atoms.

Silicides and Borides

The comparatively large diameters of silicon and boron result in more complex crystal structures. The size of the silicon atom is such that direct metal-metal atom bonding cannot occur in the disilicides of Groups IVA. VA and VIA transition metals. The metal-silicon and silicon-silicon bonds are, therefore, more important than the metal-metal bonds in determining the structure and properties of the silicides. Since the melting points of these compounds are much lower than those of the mono-carbides, then it is deduced that the high melting points of the carbides are primarily due to the strong metal-metal bonding.

The size of the boron atom is intermediate between that of carbon and silicon, so that metal-metal bonding is possible, although it is believed the individual or combined effects of the metal-boron and boron-boron bonds are predominant in the borides.

A rational interpretation of the bonding in carbides, silicides and borides is emerging, but much remains to be done before the ideas can be put to practical use.

References

 D. A. Robins; "Bonding in Carbides, Silicides and Borides," Powder Metallurgy, 1958, No. 1/2, 172.
 C. Agte and H. Alterthum; Z. Techn.

Physik, 1930, 11, 182.

Copper Cables

WITHIN the 62 pages of "Copper Cables," a new Copper Development Association publication (No. 56), there are chapters devoted to the properties of copper and some of its alloys, the manufacture of copper wire, power, transmission and other types of insulated cables. An appendix, bibliography and list of applicable British Standards, together with numerous diagrams and illustrations, are also included in this book, which, similar to all other C.D.A. publications, may be obtained free from the Association at 55 South Audley Street, London, W.1.

PROGRESS IN THE PRODUCTION AND FABRICATION OF METALS

Western American Metals Congress

Harch 16-20, the theme of the 11th Western Metals Exposition and Congress was recent technological progress in the production and fabrication of metals. Particular emphasis was placed on production applications useful in aircraft and missile fields, and new and refined techniques, such as explosive forming of metals, were everywhere in evidence among 361 industrial exhibits in the spacious Pan-Pacific Auditorium.

Exhibitors were enthusiastic, with show attendances that exceeded 60,000 visitors for the five-day run. Practically all reported increased sales over previous shows and more prospects for business than ever before; one concern wrote an order for \$750,000, and another for \$200,000. So successful, in fact, was the show that A.S.M. heads have set a return date, March 20-24, 1961, for the display in Los Angeles.

Highlights of the show as far as new metal forming techniques were concerned were a number of explosively-formed components shown by Aerojet-General Corporation and by du Pont, and some very delicate and complex, and other more massive, chemically-contoured aircraft and missile parts displayed by Chemical Contour Corporation.

Whereas du Pont's exhibit served mainly to illustrate uses of explosives, Aerojet's display included a 54 in. diameter, ½ in. thick, 6434 steel explosively-formed dome having a 2:1 diameter:depth ratio, as well as less drastically worked stainless steel and titanium beaded sheets for integrally stiffened aircraft panels. Many other metals, including a wide range of aluminium alloys, are now being explosively formed as a matter of everyday production, and both du Pont and Aerojet undertake work of this kind on a contract basis for a large number of companies.

Chemically milled metal parts were noteworthy for the very close dimensional tolerances to which they had been formed, as well as for their excellent surface appearance, which rather resembled that of a high quality diecasting. Massive, integrally stiffened missile panels and small, intricate components in aluminium, magnesium, stainless steel and titanium, amply represented the scope of this new process, which will undoubtedly find widening application in the increasingly complex and elegant constructions required in advanced aircraft and missile engineering.

Another company, prominent in metal forming, who had a stand at the show, was Arrowsmith Tool and Die Corporation. This company displayed titanium panels made by a hot forming process that shapes and stress relieves in one operation. The same concern also offers a wide range of plastics tools and dies for short-run production.

Vacuum melting of metals was a subject for advertisement by all the producers of "space-age" metals and alloys. Crucible Steel, Latrobe Steel and Vanadium Alloys Steel were showing examples of consumable arc melted, ultra high strength steels. On the non-ferrous side, Fansteel Metallurgical Corporation and Union Carbide Metals Corporation were typical exhibitors of the more exotic materials, tungsten, molybdenum, tantalum, chromium, vanadium, niobium, zirconium, titanium and silicon being featured in miscellaneous displays.

A chemical reactor vessel with a complete inner lining of "Haynes" tantalum was among the fabrications on display. This vessel, conventional in outward design, represents a definite forward step in special metal fabrication.

It is believed to be the largest of its kind ever made in tantalum. Two of the important developments in recent years regarding tantalum metal are the availability of larger sheets and improved welding characteristics.

The vessel on display was a 30 gal. unit designed to operate at 650°F. and 500 lb/in². The base material is Type 430 stainless steel, § in. thick, with a 0-030 in. lining of "Haynes" tantalum. A tantalum-sheathed agitator shaft with a solid tantalum agitator is part of the inside equipment. Every part of the vessel that will come in contact with the product is either made of, or sheathed with, tantalum. Overall

weight of the assembled vessel is about 1,000 lb., without the drive mechanism.

The Haynes Stellite Company has been engaged in the development of production facilities for making tantalum by the consumable electrode process. Formerly, the maximum weight available in a swaged bar was 20-25 lb. The new method produces a larger ingot which, of course, will allow production of larger sheets. At the present time, sheet up to 24 in. wide and 60 in. long has been produced.

Refractory parts made of slip cast silicon nitride, tungsten and other metals and metal ceramics, were exhibited by Haynes Stellite Company. Also in the refractory field appeared the new art, called "flame ceramics" by its advocates, Continental Coatings Corporation. This is a process permitting rapid spray application of awide variety of oxide coatings to almost any material that will withstand momentary application of an oxyhydrogen flame. On show were flame ceramic coated articles ranging from diesel engine pistons and valves to golf irons.

Among the many other interesting exhibits were bonded aluminium and stainless steel honeycombs on the stand of Hexcel Products Inc.; pattern developments and new colour and highlighted treatments of textured metal surfaces, by Rigidised Metal Corporation; forgings for missile, aircraft, nuclear and other applications in "difficult" materials, including titanium, zirconium and molybdenum, by Ladish Company; and many ingenious small tools, such as the portable (12 lb. weight) air-powered nibbler, demonstrated by Fenway Machine Company



Chemical reactor vessel of 30 gal. capacity, completely lined with tantalum. Parts exposed to the product are made of or sheathed with high-grade, vacuum-cast tantalum

Inc., which was capable of cutting $\frac{1}{10}$ in. copper or 8 g. mild steel without distortion.

Technical Sessions

Hailed as a major technical "breakthrough" in man's long history of pounding and pressing, squeezing and smashing, melting and otherwise manhandling metals into specified shapes, "Explosive Forming" was highlighted by a two-day series of panel conferences, attended by over 300 metallurgists and engineers. Panel members discussed the "why" of explosive forming; materials that could be formed; speed, cost saving and tolerance precision possible with the most difficult materials.

Others presented data on energy sources — in the main explosives, although hydraulic systems were not altogether ignored — and spoke of attainable, instantaneous pressures of 1,000,000 lb/in², far in excess of the heaviest die pressures, which could be exerted with the new explosive technique.

Dies and die materials including,

surprisingly, plastics, were covered, and the meeting concluded with a thoroughly practical session devoted to explosive forming production applications.

Altogether, about 40 technical sessions, spread over five days, attracted an attendance of over 6,000 technologists interested in offerings on semiconductors, thermo-electric materials, materials for very high temperatures, and in becoming up-to-date on non-destructive testing, brazing and welding, and conventional production and fabrication processes.

Men and Metals

In succession to Mr. Walter Gardner, who has been chairman of the Amalgamated Metal Corporation for 16 years, Sir Paul Benthall has been appointed a director of the company and elected chairman. Mr. Gardner will retain his directorship.

Formerly vice-president of Aluminium Laboratories Limited, in charge of the Banbury research laboratory and of the company's Geneva office, Mr. Robert D. Hamer has assumed the post of chief executive



officer for Aluminium Limited's international sales in Europe, Middle East and North Africa, with headquarters in Zurich. Mr. Hamer is a Fellow of the Institution of Metallurgists and the Royal Institute of Chemistry, a vice-president of the Institute of Metals, and a former President of the Aluminium Development Association.

Completing his term of office as President of the Society of Chemical Industry at the annual general meeting of the Society, to be held in Glasgow on July 10 next, Sir Robert Robinson, O.M., F.R.S., will be succeeded as President by Mons. E. J. Solvay, of Brussels. Mons. Solvay is a direct descendant of the discoverer of the ammonia soda process which bears his name.

British industry in general—and the chemical industry in particular—loses an outstanding leader with the retirement of Sir Ewart Smith, F.R.S., from the board of Imperial Chemical Industries Limited. An engineer of distinction (he obtained 1st class honours in the mechanical science tripos at Sidney Sussex College, Cambridge), Sir Ewart joined Synthetic Ammonia and Nitrates Limited (later the Billingham Division of I.C.I.) in

1923, and subsequently played a part in the major development of the huge Billingham complex, becoming its chief engineer in 1932. He was seconded to the Ministry of Supply in 1942, and returned to I.C.I. in 1945, when he was appointed technical director. He was knighted for his wartime services in 1946

Manager of the process heating department of The General Electric Company Limited, Mr. Verdon O. Cutts retired at the end of last month. He joined the company in 1929 and built up the process heating department covering electric furnaces, high frequency heating and infra-red heating. In 1953, Mr. Cutts was President of the electric furnace section of the International Congress on Electro-Heat, which was held in Paris.

It is announced by the Northern Aluminium Company Limited that Mr. E. L. Ashley, formerly manager of the Banbury works for over a quarter



of a century, has been appointed a director of the company. Mr. Ashley has recently accepted a special assignment for the company which will take him, in the first instance, to North America.

A further announcement from the Northern Aluminium Company Limited is that Mr. Kenneth Hall, assistant director of operations of the parent company, Aluminium Limited, of Montreal, and a director of Northern Aluminium, has resigned.

Changes on the Council of the Iron and Steel Institute are announced to take place at the annual general meeting, to be held on May 6 next, as follows:—President, Mr. W. Barr,

O.B.E.; hon. treasurer, Sir Julian Pode; vice-presidents, Mr. B. Chetwynd Talbot and Mr. C. H. T. Williams; Ordinary Members of Council, Major W. R. Brown, D.S.O., and Mr. T. R. Craig, O.B.E., T.D. Additional Honorary Members of Council, Dr. N. P. Allen, F.R.S., and Mr. A. Jackson.

Awards of the following medals and prizes have also been announced by the Council of the Iron and Steel Institute: Bessemer Gold Medal for 1959 to Professor Bo Kalling, until recently Director of Research, Stora Koppar-bergs Bergslags Aktiebolag, Sweden. Sir Robert Hadfield Medal for 1959 to Mr. Albert Jackson, technical adviser on steelmaking to the United Steel Companies Limited. Andrew Carnegie Silver Medal for 1958 to Dr. P. Vasudevan, Department of Metallurgy, University of Manchester, and the Williams Prize for 1958 to Mr. H. C. William Child, research manager, Jessop and Sons Limited.

An appointment recently announced by Alfred Case and Company Limited is that of Mr. P. A. Hall to the position of sales manager. Mr. Hall is 31 years of age. He joined a company of non-ferrous metal manufacturers direct from school, and completed a thorough training, both practical and theoretical. In his new position, Mr. Hall will cover the organization of the company's sales representatives throughout the British Isles.

At the annual general meeting of the Non-Ferrous Club, held in Birmingham, Mr. W. H. Demel was re-elected President for the ensuing year. Five members of committee were elected as follows: Mr. R. L. Deutsch (Deutsch and Brenner Limited), Mr. R. J. Freeman (A. D. Keeling and Company Limited), Mr. Hugo McGhee (Hugo McGhee (Metals) Limited), Mr. P. Mould (Mould Bros. (Camp Hill) Limited), and Mr. W. H. Vizor (Deutsch and Brenner Limited).

Meeting on Wednesday last week, the committee of the Non-Ferrous Club made the following appointments: Chairman, Mr. W. H. Vizor; secretary, Mr. M. L. B. Wright; treasurer, Mr. A. E. Teasdale; and press officer, Mr. G. E. Lewis

Tinning Copper Wire

FOR the continuous tinning of copper wire at the Lydbrook Cable Works of Siemens, Edison and Swan Ltd., Lydbrook, Gloucestershire, a cast iron bath, originally heated by electricity, has been successfully converted to gas firing. The conversion was designed by the Area Industrial Department, South Western Gas Board, and the work carried out by the maintenance section of the firm, according to a report issued by the Industrial Gas Development Committee of the Gas Council.

The bath is 35 in. long, 18 in. wide and 5 in. deep, and has a capacity of $5\frac{3}{4}$ cwt. of tin. It is housed in a 3 in. firebrick lined steel casing, supported

by an angle iron frame.

The burner system consists of two bar burners, each carrying 22 Bray Jets No. 478, size ½. Air for combus-

tion is admitted to the burners through two openings of $20 \text{ in} \times 3 \text{ in}$. below the burners. The products of combustion are discharged through two slots $5 \text{ in} \times \frac{1}{2} \text{ in}$. located at each end of the setting under the flange of the pot.

Automatic temperature control is provided by a Coley Model "G" temperature controller, calibrated 0°-700°F, and working in conjunction with a $\frac{3}{4}$ in. Perl relay gas valve. This equipment is set to control the temperature at 520°F.

Copper wire is fed from coils into an acid or flux bath containing a 10 per cent solution of hydrochloric acid, where it is cleaned electrolytically, the current being varied according to the size of wire being tinned. The currents used during the tests were as follows:

0-072 in. wire—30 amp at 10 V per strand of wire; 0-064 in. wire—26

amp at 10 V per strand of wire. The wire is drawn through the molten tin, being guided by a series of small pulley wheels, thence passing through asbestos wool to remove excess tin, and finally through water-cooled tubes before being recoiled on spools or bobbins. It is then despatched to the stranding department of the factory for cable manufacture. The test results are given in Table I.

From the test results it is apparent that the speed of the wire during tinning should be kept under supervision. Lower gas consumption and casing temperature might have been achieved by the use of insulation brick in place of firebrick.

Correspondence

Correspondence is invited on all subjects of interest to the non-ferrous metal industry. The Editor accepts no responsibility either for statements made or opinions expressed by correspondents whose letters appear in these columns

TO THE EDITOR OF METAL INDUSTRY

B.S.S. 1400

SIR,—I have noted your editorial under the above heading in the issue of METAL INDUSTRY for March 27.

Over the past two years, the B.S.I. Committee NFE/-/2 has been actively engaged in establishing reliable analytical procedures for the "complete" examination of copper-base alloys,

Special attention has been given to the provision of chemical procedures for the determination of aluminium, silicon and iron in the ranges indicated in your article. Provision has also been made for the determination of copper, tin, lead, etc., and the Committee has very much in mind the requirements embodied in B.S.S. 1400.

Draft procedures for some of the determinations, including silicon, have passed the committee stage, and are ready for circulation and comment by industry, etc., in the usual way before B.S.I. Standards are finally released for general use.

Analytical procedures for the other elements specifically referred to in your editorial should be available in the very near future.

This timely statement, relative to the activities of Committee NFE/-/2, reflects on the hard work and foresight of its members and its secretary, Miss R. Cleary.

Yours, etc.,

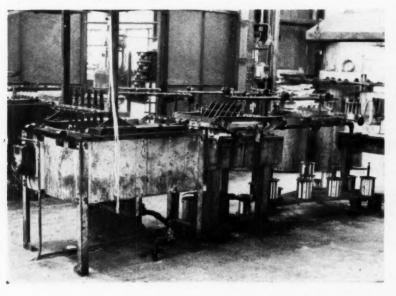
W. T. Elwell. Chairman.

B.S.I. Committee NFE/-/2.

TABLE I-TEST RESULTS

Test Conditions	Test I	Test II
Diameter of wire	0·072 in.	0·064 in.
Speed of wire specified	125 ft/min.	145 ft/min.
Speed of wire (actual)	134 ft/min.	129 ft/min.
Weight of copper wire tinned	280 lb.	350 lb.
Weight of wire 1,000 yd.	47·1 lb.	37·2 lb.
Length of wire tinned	5,900 yd. (approx.)	9,400 yd. (approx.)
Weight of tin used	5.9 oz.	9·4 oz.
Gas used	97 ft ³	136 ft ³
Calorific value	470 B.t.u. ft ³	470 B.t.u/ft ³
Heat used	45,590 B.t.u.	63,920 B.t.u.
Duration of test	44 min.	73 min.
Average CO. (full gas)	10.7 per cent	10.9 per cent
Average CO ₂ (by-pass gas)	2·4 per cent	2·4 per cent
Average temperature of tin	521°F.	520°F.
Atmospheric temperature	69°F.	73°F.
Gas consumption per 1,000 lb. of wire	346.4 ft ⁸ (1.63 therms)	388.6 ft ³ (1.82 therms)
Gas consumption per 1,000 yd. of wire	16·44 ft³ (0·077 therms)	14.47 ft3 (0.068 therms)

Arrangement of tinning bath for copper wire



Industrial News

Home and Overseas

Engineering Exhibition

On Thursday of next week (April 16) the Engineering, Marine, Welding and Nuclear Energy Exhibition will open at Olympia, London, and will show the latest advances in every branch of heavy engineering, and most of the 500 exhibitors will have something entirely new to

The exhibition will be opened by Sir Edward W. Thompson, M.A., J.P., Honorary President of the Exhibition and President of the British Engineers' Association. The exhibition will remain open until April 30.

Overseas Enquiries

It has been reported to the Board of Trade by the U.K. Trade Commissioner at Winnipeg that Mr. F. Thornes, of Thornes Manufacturing Ltd., 110 Violet Street, Thunder Bay District, Fort William, Ontario, is interested in obtaining a U.K. source of supply for brass rod in \(\frac{1}{2}\) in. and \(\frac{7}{2}\) in. rounds. Mr. Thornes estimates that his company will require approximately half a million lb. per annum. Suppliers interested in this enquiry are advised to contact the Canadian firm direct.

The Iranian Tobacco Monopoly, Teheran, Iran, is asking for tenders for aluminium foil of 0.007 mm. thickness, exterior glazed, fully stuck to the tissue paper and with a quality as per sample. The closing date for receipt of tenders is May 16 next. A copy of the tender documents, including specification and samples, is with the Export Services Branch, the Board of Trade, Lacon House, Theobalds Road, London, W.C.1 House, Theobalds R (Ref. ESB/8223/59).

Corrosion Exhibition

A wide range of products of great interest to industries constantly faced with corrosion problems will be on show on the Shell Chemical Company Ltd. stands at the forthcoming Corrosion Exhibition to be held this month at the Royal Horticultural Society New Hall, in London.

The solid grades of "Epikote" resin, widely used in the formulation of highgrade anti-corrosion surface coatings, will be featured and, for the first time at this exhibition, industrial applications of the liquid "Epikote" resins will be exhibited. This range of resins is used for the manufacture of laminated vessels and piping for chemical plant, and for corrosion-proof cements and screeding compounds.

Welding Rods

Two new additions to their range of Sifbronze welding rods have been announced by Suffolk Iron Foundry (1920) Ltd. Process "101" is stated to be a new method of joining cast iron by process welding, and Process "104" is a new rod of the same alloy as Sifbronze rod "101" but coated with a new type of flux coating for continuous welding.

Speed Regulator

After considerable development and field evaluation trials, Baldwin Instru-ment Co. Ltd. announce that they are now in production with a new improved speed regulator, for use with their com-pressed air cylinders. These new units

are an improved development of the earlier micrometer type, and have a regulation of at least three times that of the previous model. The bore sizes are \(\frac{1}{4}\) in., \(\frac{1}{2}\) in., and \(1\) in.

New Appointments

It has been announced by Baldwin Instrument Company Ltd. that agents and technical representatives have been appointed as follows: Scotland—James Scott and Co. Ltd., 68 Brockville Street, Carntyne Industrial Estate, Glasgow, E.2 North of England — Wm. Don and Partners Ltd., Crown Works, Crown Point Bridge, Leeds, 9. Midlands—Mr. P. Lawrence, 16 Hawthorn Road, Kings Norton, Birmingham (technical representative). Mr. J. D. Thornley, of Waterhey Cottage, Rivington, nr. Bolton, Lancs., is technical representative for the North of England. The home counties, Wales and the West country will still be covered by the technical staff based at the company's premises at Dartford, Kent.

Cathodic Protection

An ingenious yet simple means of preventing corrosion in auxiliary heat exchangers and small condensers, etc., is now being manufactured in this country. The Galvion anode, of which there are three sizes, comprises a brass plug with B.S.P. tapered threads and a number of high purity zinc "bobbins" or elements having a threaded centre steel core. elements can thus be screwed into each other to allow adjustment of length to fit confined spaces without waste. An interference thread ensures vibration proof service.

The exclusive distributors of this anode in the Commonwealth and a number of European countries are F. A. Hughes and Company Ltd.

Italian Copper Trade

Italy's imports of crude copper for smelting and refining in 1958 were 9,535.5 metric tons, valued at 3,101,775,000 lire, which 501.1 metric tons, valued at 149,649,000 lire, were temporarily imported, according to the Central Statistical Office, Rome.

Main suppliers were Indonesia, 101-3 metric tons; South Africa, 1,757-6; Chile, 5,959-1; the U.S., 491-3; and Rhodesia, 1,165-6 metric tons. Imports of refined copper in slabs, ingots, shot and powder were 94,061.9 metric tons, valued at 29,818,510,000 lire, of which 18,148-2 tons valued at 5,948,748,000 lire were imported temporarily. Main suppliers were Belgium/ Luxembourg, 3,124-9 metric tons; Britain, 12,443-3; Belgian Congo, 16,563-5; Rhodesia and Nyasaland, 7,422-1; South Africa, 6,103-5; Canada, 5,161-0; Chile, 12,390-4; and the United States, 25,908.

Safety Conference

To be held in Scarborough from May 8 to 10, 1959, the National Industrial Safety Conference and Trade Exhibition is being organized by the Royal Society for the Prevention of Accidents.

The opening address will be presented by Monsieur Marcel Robert, Chief of the Occupational Safety and Health Division of the International Labour Office.

The remainder of the programme will be made up of Papers which have been designed to stimulate the extension of the already far-reaching knowledge understanding of conditions which tend to promote industrial accidents.

Another important event in the industrial safety calendar which occurs at the same time as the National Industrial Safety Conference, is the presentation of the Sir George Earle Trophy by Sir Howard Roberts, President of the Royal Society for the Prevention of Accidents. The Trophy is awarded annually to the company or organization making the most meritorious contribution to industrial accident prevention. In 1958, this trophy was awarded to Imperial Chemical Industries Limited. The name of this year's winners will be announced towards the end of April.

The theme of this year's campaign will be the easier handling of materials, the intention being to spread knowledge about the advantages of the kinetic method of lifting loads to avoid muscular strain and fatigue.

Enquiries about the conference should be addressed to the Industrial Safety Division, Royal Society for the Prevention of Accidents, Artillery Mansions, 75 Victoria Street, London, S.W.1. Telephone Abbey 6963.

French Metallurgical Symposium

The autumn meeting of the Société Française de Métallurgie will be held in Paris from Monday, October 19, to Saturday, October 24, 1959. The subject chosen for discussion is "Gases in Metals," and Papers on this subject or other metallurgical subjects are invited. Further information can be obtained from Société Française de Métallurgie, 25, Rue de Clichy, Paris, 9 eme, France.

New Tower Furnace

A furnace recently designed and constructed by Ferro Enamels Limited is claimed to give remarkable results in thermal efficiency. The furnace is essentially a tower, and represents a complete departure from normal practice. It is now installed at the Tipton Enamel Company's factory—a subsidiary of Revo Electric Company Limited.

The furnace is electrically heated and has an installed load of 200 kW, which is controlled in two zones, one in the top half of the furnace and the other on the bottom half. The elements are displaced over the sidewalls only and the most modern safety features are incorporated.

Atomic Power Station Contract

An order for the construction of a 50 MW atomic power station at Tokai-Mura, some 70 miles north-east of Tokyo, Japan, will be worth some £20,000,000 The General Electric Co. Ltd. order marks an important step forward for the company, which has been reorganized into three main groups with a view to giving greater drive to its main activities, particularly the development of its heavy engineering and nuclear energy side. The success achieved in Tokyo has been accompanied by several other large engineering orders during the last month, including an order for two 200 MW turbo-generator sets for the Kincardine station of the South of Scotland Electricity Board, valued at about £4,000,000,

and an order for a complete ore preparation plant for the Redbourn Works of Richard Thomas and Baldwin Limited, valued at about £1,250,000.

Apprentices' Awards

At the annual prizegiving on April 2 at Kelvin and Hughes Ltd., Barkingside, Mr. Arthur Hugnes, who until he retired in 1955 was managing director of Henry Hugnes and Son Ltd., presented the Arthur Hugnes prize for the second year to the applicatice who had showed in his final year the best ability as a craftsman at the Kelvin Hugnes factory at Barkingside, London. Winner for the past year was Peter K. Launder.

Seven other apprentices received awards from Kelvin Hughes after being judged as reaching particularly high standards during the past year. They were: Howard Stanley Crouch (Walthamstow), Ramon Henry Mechan (Hainauit), Coin J. Goodey (Hainauit), John W. Sneil (Barkingside), David Brian Chizlett (Chadwell Heath, Komford), Alien Kusseli Jackson (Hainauit), Geoffrey Stanley Prost (Barkingside).

Ergonomics Conference

On the theme "Ergonomics—its place in industry," the Ergonomics Research Society's 10th Anniversary Conference opened at Oxford last Monday to study "the relation between man and tne environment in which he works." The conference was opened by the Rt. Hon. Ernest Marpies, M.P., Postmaster-General, and the chairman was Sir David Lindsay Keir, Master of Balliol.

Up to now, ergonomics has been largely the plaything of "backroom boys" at universities and research institutions. Only three industrial organizations in this country have trained ergonomists on their statts. One of these companies, E.M.I. Electronics Ltd., is providing two of the three speakers from industry at this year's conference.

Malayan Tin

Production of tin concentrate in Malaya during February was 56,951 piculs contaming 2,561 tons of tin metal, based on the true assay of 75.56 per cent, according to Malayan mining statistics.

This compares with January production, which totalled 68,203 picuis containing 3,069 tons of tin metal, based on the true assay of 75.60 per cent.

At end-February there were 40 dredges, 303 gravel-pump mines and 43 other tin mines in operation, totalling 386 active mines. The January figures were 41 dredges, 314 gravel-pump mines and 49 others, totalling 404 active mines.

European Lead and Zinc

Refined zinc production for O.E.E.C. producer countries, i.e. Austria, Belgium and the Belgian Congo, France, Germany, Italy, the Netherlands, Norway and the United Kingdom, amounted to 64,071 metric tons in February, 1959, as compared with 69,672 metric tons in January, 1959. This level of production is slightly lower than that of February, 1958.

The February, 1959, breakdown into qualities is as follows: High grade and special high grade zinc (at least 99.95 per cent zinc content) 24,076 metric tons; others (G.O.B., debased) 39,995 metric

Total pig lead (minimum content 99.95 per cent) production in O.E.E.C. producer countries, i.e. Austria, Belgium, Denmark, France, Germany, Greece, Italy, the

Netherlands, the United Kingdom and Sweden, as well as in Morocco and Tunisia, amounted to 46,296 metric tons in February, 1959, as compared with 51,166 metric tons in January, 1959.

As compared with February, 1958, there is a decrease of about 5 per cent in the level of production.

U.K. Metal Stocks

Falling by 570 tons at the end of last week, stocks of refined tin in London Metal Exchange warehouses were distributed as follows: London, 5,389; Liverpool, 3,652; Hull, 1,138; making a total of 10,179 tons.

Stocks of refined copper fell by 225 tons, and were as follows: London, 1,972; Liverpool, 4,019; Birmingham, 2,700; Manchester, 2,950; a total of 9,641 tons.

Portuguese Exhibition

At the British Trade Fair, to be held in Lisbon this year, Wild-Barfield Electric Furnaces Ltd. will be exhibiting a selection of equipment. The largest furnace will be a horizontal batch type equipment Model HW1610, having a chamber 30 in. long with a door opening 16 in×10 in. Apart from the automatic temperature controller—which is of the wall-mounting pattern—the furnace is completely self-contained and all the door mechanism is enclosed. Also on exhibition will be a selection of standard laboratory muffles and a forced air circulation furnace having nominal workbasket dimensions, 10 in. diameter by 10 in. deep. In addition, a small self-contained electrode salt bath—Model ESB346—will be shown.

Packing Converter Reels

A simplified method of packing wide reels of aluminium converter foil has been developed by the **Star Aluminium Co. Ltd.**, Wolverhampton, to ensure that foil despatched from their factory at Wolverhampton arrives in perfect condition.

hampton arrives in perfect condition.
Fitted with bearers for fork-truck handling, the box is divided into three sections, with fittings to support the foil. Each reel is enclosed in two halves of a fibre drum and suspended at the end on a wooden spindle and locked-in wooden discs. Air space around each reel ensures that buffeting of the exterior of the pack during transit leaves the foil undamaged.

Sections interlock, secured by steel strapping § in. wide, 0.015 in. thick, and two wooden battens, diagonally opposite. Removal of the battens and steel strappings makes the reels immediately accessible.

Venezuelan Representation

A Venezuelan company, Electro Industrial Halven/O.L. Halvorssen, C.A., Apartado 508, Caracas, wish to represent, on a commission basis, a United Kingdom manufacturer of copper pipes and sheets, and brass pipes and sheets.

The Caracas company, who were established in 1938, act as manufacturers' representatives and importers. They deal in electrical equipment, radios, plumbing and sanitary equipment, etc., and amongst their agencies they hold those of United Kingdom firms manufacturing tiles and boilers. They have a staff of 30, including four travellers, and cover the whole of Venezuela. Electro Industrial Halven/O.L. Halvorssen, C.A., are considered by the Export Services Branch of the Board of Trade to be a suitable connection for United Kingdom firms.

Manufacturers interested in this agency

enquiry should write direct to the Venezuelan firm. It would be appreciated if, at the same time, they would notify the British Embassy, Commercial Department, Apartado 1246, Caracas, that they have done so.

Die-casting Machines on Show

At the Milan Fair, which takes place from April 12-27, a large engineering section is being staged. A large stand with a good selection from their range of diecasting machines is being taken by A. Trulzi. Both water and oil hydraulic machines will be exhibited, including a "Castmatic 600," an oil-operated wedgelock machine of 600 tons capacity. The British marketing company for Triulzi machines is, of course, Alexander Cardew Limited.

Aluminium Fabrication

A new branch of its aluminium fabricating industry will shortly be established by Northern Aluminium Company Limited in New Zealand. The new plant will have an initial production capacity of 5,000 tons/annum of aluminium sheet and foil products, and 2,000 tons/annum of aluminium wire and cable for electrical transmission lines. The location of the plant has yet to be decided; alternative sites in the North and South Islands of New Zealand are being considered.

The project will require a total investment of approximately £2,000,000, almost the whole of which will be provided by Aluminium Limited and Northern Aluminium Company Limited. The plant will be planned to supply practically all New Zealand's requirements of sheet and cable products and to allow for expansion in all fields. Among its products will be aluminium sheet for roofing and siding in building construction, for vehicle bodies of all types, and for the household equipment industry. Additionally, it will cater for the packaging industry, and supply many types of electric cables for power transmission.

Forthcoming Meetings

April 14—Institute of British Foundrymen. Coventry and District Section. Room A5, The Technical College, Coventry. Annual General Meeting, followed by technical film show. 7.30 p.m.

April 14—Institute of British Foundrymen. East Anglian Section. The Lecture Hall, Public Library, Ipswich. Annual General Meeting, followed by "Modern Foundry Practice." V. W. Child. 7.30 p.m.

April 14-17—Institute of Metals. Church House, Great Smith Street, London, S.W.1. Spring Meeting.

April 15—Institute of British Foundrymen. North-East Lancashire Section. College of Further Education, Sandy Lane, Accrington. Annual General Meeting, followed by "Brains Trust." 7.30 p.m.

April 15 — Society of Instrument Technology. Newcastle Section. King's College, Stephenson Buildings, Newcastle upon Tyne. "Radiation Pyrometers." R. Barber. 7 p.m.

April 15 — Society of Instrument Technology. Tees-Side Section. Cleveland Scientific and Technical Institute, Corporation Road, Middlesbrough. "Instrumentation of Open-Hearth Furnaces." C. Holden. 7.30 p.m.

Metal Market News

ITH the exception of zinc, which even so closed above the lowest, all the metals last week showed improvements in value on the London Metal Exchange. Outside business was not very brisk, for in the Midlands, at any rate, factories were closed on Monday and Tuesday, while elsewhere there was a disinclination to enter into fresh commitments. Trading in Whittington Avenue did not begin until Tuesday, so that turnovers were below average. Wall Street displayed signs of nervousness, and on the London Stock Exchange sectional reactions were seen, but for the most part the pre-Budget markets registered optimism. As we write, it is not yet known whether this expectation of better things to come will be upheld by the contents of the Chancellor's proposals, but, rightly or wrongly, sentiment is looking for good news in the House when the time comes. Copper climbed over £250 last week, mainly on news from overseas which suggested the possibility of strike trouble in Chile and elsewhere. This condition of unrest is widespread at the present time and in the background there is, of course, the prospect that serious developments may take place in the United States when the new wages agreement with the metal workers comes to be negotiated later in the year.

In that metal the price anomaly situation is as great as ever, for in the United States the producers are holding their quotation down at 31.50 cents per lb, while the custom smelters have maintained 34 cents in the face of the setback in London which occurred before the holiday. On the Commodity Exchange there have been severe bouts of profit taking, and at one time it looked very much as though the end of the big upward movement had come at last. However, last week saw a resurge of optimism and some strong buying, which seemed to show that bullish enthusiasm for copper is not yet dead. Nevertheless, it is probably true that, at £250 and over, fabricators in the U.K. feel that substitution by other and rival metals is rather more than a possibility, and a further increase in value, if it comes, would be unwelcome. Undoubtedly the users of copper are apprehensive of a runaway market, for they will not easily forget what happened three years ago, and although the idea of a "managed" price has not necessarily taken a strong hold, yet it must be confessed that were the quotation to go ahead strongly consumers would probably lend an attentive ear to any such proposals.

Last week's copper market from Tuesday to Friday saw a turnover of 8,025 tons following a further rise in stocks of 650 tons to 9,866 tons. The "close was £251 10s. 0d. cash and three months, which showed a rise of £5 5s. 0d. in both positions. News of a "walk-out" at the Chino Division of Kennecott Copper Corporation was reported on Friday and resulted in a sharp advance on the afternoon market, but after hours a report that the strike had been settled brought a reaction of £1. Lead was weak, with a turnover of 6,775 tons, and, following a cut of tcent in the States, declined to a new low of £66 for the current month. An improvement, however, took the price to £68 17s. 6d. at the close, with July at £70 5s. 0d. About 5,400 tons of zinc changed hands, the close being £71 10s. 0d. both positions, a reduction of about 30s. Tin was firm and on a turnover of 770 tons closed £6 up for cash at £782 and £4 10s. 0d. better for three months at £785 10s. 0d.

Birmingham

Users of non-ferrous metal in the Midland area are buying sparingly. There is no appreciable change in the generally quiet conditions which have prevailed during the first quarter. Some improvement is taking place in the employment situation. Much of the short-time working which occurred earlier in the year has been cut out, and there are rather more vacancies to be filled in the works and foundries. The sustained activity in the motor trade continues the backbone of industry, but the improvement which took place in the goods vehicle building section seems to have subsided again. Rather more work is reported in the market for builders' brassfoundry. Export business is only

The heavy structural steel market is in need of a stimulus. After a long spell of full activity, the mills making heavy joists and sections have only a small amount of work for future rolling. The re-rolling mills continue on short time because of the lack of business in small bars and sections. A big decline has taken place in the buying of foreign steel. Ample supplies of semi-finished steel can be obtained from British works, and scarcities have been overcome in all but a few products. The need for basic iron for steelmaking is very restricted. Ironfounders who supply the needs of the motor trade have a good volume of business in castings.

New York

Towards last week-end, copper futures slipped on profit-taking, with dealings for Thursday fair. In physical copper, custom smelters reported fair sales at 34 cents a lb. for the April-May position. Two leading producers were still not selling the May position, with April about sold out. Producers reported continued active demand for 311 cents copper.

Lead saw fair sales, while zinc also had fair business indicated. Shipments of lead and zinc from the mines virtually ceased as a result of the Mexican railway strike. Tin was firmer but quiet, the advance reflecting the Singapore market.

On Friday, copper futures were quite steady in fairly active dealings, while custom smelters reported satisfactory sales at 34 cents a lb. There was little change in producer copper, with two leading producers still not selling for May, and April sales about completed. Kennecott Chino Mines at Hurley, New Mexico, closed down for part of Thursday because of the walk-out by about 950 union members protesting a local grievance. How-ever, the men returned to work on Friday. Tonnage lost was considered negligible, 100 tons or so.

Lead and zinc were quiet. On the silver market the price remained at 915 cent a fine ounce.

According to the Bureau of Mines, United States Department of the Interior, world production of cobalt decreased for the second successive year to about 14,000 short tons in 1958. Production was 10 per cent less than in 1957. Production of cobalt by Canada and Belgian Congo sharply decreased in 1958, but these losses were partially offset by increases in Northern Rhodesian and United States production. Output of recoverable cobalt in the United States was 2,009 short tons in 1958, compared with 1,649 tons in 1957.

Consumption of cobalt in the United States declined to 7,475,000 lb. in 1958. It was 18 per cent less than in 1957 and 20 per cent below the average for the five years 1953-57. The decline in consumption resulted chiefly from a 20 per cent drop in usage of cobalt in permanent magnets and high-temperature alloys, the two major uses.

Imports decreased to 16,487,000 lb. (cobalt content), a 6 per cent loss from Imports in 1958 comprised 16,027,894 lb. of metal; 839,980 lb. of oxide containing 631,767 lb. of cobalt and 234,375 lb. of salts and compounds containing about 49,219 lb. of cobalt. No white alloy or ore was imported in

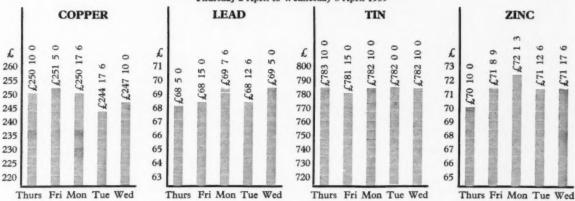
Toronto

A reduction in the price of its zinc has been made by Consolidated Mining and Smelting Company of Canada Limited. The reduction is effective immediately and brings the price down by half a cent a lb. to 103 cents per lb. f.o.b. Montreal/ Toronto.

Non-Ferrous Metal Prices

London Metal Exchange

Thursday 2 April to Wednesday 8 April 1959



Primary Metals

				All	prices quoted are those available at 2 p.m. 8/4/59	
Aluminium Ingots	ton			d. 0	Copper Sulphate ton 79 0 0 Palladium oz. £ s. d. 5 15 0	;
Antimony 99.6%	33	197	0	0	Germanium grm. — Platinum ,, 28 10 0)
Antimony Metal 99%	99	190	0	0	Gold oz. 12 9 21 Rhodium ,, 40 0 0)
Antimony Oxide	23	180	0	0	Indium, 10 0 Ruthenium, 14 0 0)
Antimony Sulphide					Iridium	
Lump	99	190	0	0	Lanthanum grm. 15 0 Silicon 98% ton nom.	
Antimony Sulphide		005	^	0	Lead English ton 69 5 0 Silver Spot Bars oz. 6 7	1
Black Powder				0	Magnesium Ingots lb. 2 3 Tellurium lb. 15 0)
Arsenic		400		0	Notched Bar ,, 2 9½ Tin ton 782 10 0)
Cadmium 99.9%				0	Powder Grade 4, 6 1 *Zinc Alloy Ingot, A8 or AZ91 p 2 4	
Calcium		2	0	-	Electrolytic ton —	
Cerium 99%		16		0	Will 99.99 /0 · · · · · · · · · · · · · · · · · ·	
Chromium		10		11	Mercury flask 78 0 0 Virgin Min 98% , 71 17 6 Molybdenum lb. 1 10 0 Dust 95/97% , 109 0 0	
Cobalt			14		Nickel ton 600 0 0 Dust 98/99% , 115 0 0	•
Columbite per unit	33		_		F. Shot	,
Copper H.C. Electro t	on	247	10	0	F. Ingot 35 6 Granulated 99.99+% 3, 109 18 9	1
Fire Refined 99.70%	II)	246	0	0	Osmium oz. nom. *Duty and Carriage to customers' works for	75
Fire Refined 99.50%	93	245	0	0	Osmiridium , nom. buyers' account.	

Foreign Quotations

Latest available quotations for non-ferrous metals with approximate sterling equivalents based on current exchange rates

	Belgium $fr/kg \stackrel{\frown}{=} \mathcal{L}/ton$								n		taly ;≏£/ton	1	zerland ≏£/ton	United States c/lb ←£/ton	
Aluminium				22.50	185 17	6 210	157	10	375	221 5	2.50	212 10	26.80	214	10
Antimony 99.0						220	165	0	445	262 10			29.00	232	
Cadmium						1,350	1,012	10					145.00	1,160	0
Copper Crude Wire bars 99.9 Electrolytic	34.25	252	0	30.50	252 0	344	258	0	490	289 2 6	3.05	295 5 0	31.50	252	0
Lead				10.25	84 12 6	102	76	10	162	95 10	1	74 0		88	0
Magnesium											1				
Nickel				70.00	578 5	900	675	0	1,200	708 0	7.50	637 10	74.00	592	0
Tin	111.75	822	10			1,123	842	5	1,500	885 0	9.60	816 0	103.00	824	0
Zinc Prime western High grade 99.95 High grade 99.99 Thermic Electrolytic				10.75 11.35 11.75	88 15 0 93 15 0 97 0 0	108.00 117.00	81 87	0	168	99 2 6	.99	84 2 6	11.00	88	

Non-Ferrous Metal Prices (continued)

•	Ingot Metals	0.44/20
	*Brass f. s. d	
Aluminium Alloy (Virgin) £ s. d. B.S. 1490 L.M.5 ton 210 0 0	BSS 1400-B3 65/35 ton 162 0	Phosphor Copper £ s. d. 10% ton 263 0 0
B.S. 1490 L.M.6 ,, 202 0 0	BSS 240	15% ,, 265 0 0
B.S. 1490 L.M.7 , 216 0 0 B.S. 1490 L.M.8 , 203 0 0		Phosphor Tin
B.S. 1490 L.M.9 ,, 203 0 0	*Gunmetal R.C.H. 3/4% ton , —	5%,
B.S. 1490 L.M.10 ,, 221 0 0 B.S. 1490 L.M.11 ,, 215 0 0	(85/5/5/5), 202 0	
B.S. 1490 L.M.11 , 215 0 0 B.S. 1490 L.M.12 , 223 0 0	(86/7/5/2)	
B.S. 1490 L.M.13 ,, 216 0 0	(88/10/2/½) , 268 0	
B.S. 1490 L.M.14, 224 0 0 B.S. 1490 L.M.15, 210 0 0	*Manganese Bronze	Solder, soft, BSS 219 Grade C Tinmans, 363 0 0
B.S. 1490 L.M.16 ,, 206 0 0	BSS 1400 HTB1 ,, 200 0 0 BSS 1400 HTB2 ,, 209 0	Grade D Plumbers ,, 291 15 0
B.S. 1490 L.M.18 ,, 203 0 0 B.S. 1490 L.M.22 ,, 210 0 0	BSS 1400 HTB2 ,, 209 0 (BSS 1400 HTB3 ,	Grade M 398 15 0
†Aluminium Alloys (Secondary)	Nickel Silver	Solder, Brazing, BSS 1845
B.S. 1490 L.M.1 ton —	Casting Quality 12% ,, 225 0 (,, 16% ,, 235 0 (Type 8 (Granulated) lb. — Type 9 ,, —
B.S. 1490 L.M.2 ,, —	,, ,, 16% ,, 235 0 (,, 18% ,, 245 0 (
B.S. 1490 L.M.4 ,, — B.S. 1490 L.M.6 ,, —	*Phosphor Bronze	Zinc Alloys Mazak III ton 103 3 9
	B.S. 1400 P.B.1.(A.I.D.	Mazak V
*Aluminium Bronze BSS 1400 AB.1 ton 235 0 0	released) , 295 0 0 B.S. 1400 L.P.B.1 , 222 0 0	Kayem II
BSS 1400 AB.2 ,, 250 0 0	*Average prices for the last week-end.	Sodium-Zinc lb. 2 6
Se	mi-Fabricated Proc	lucts
Prices vary according to dimension	ns and quantities. The following are the b	asis prices for certain specific products.
Aluminium	Brass	Lead
Sheet 10 S.W.G. lb. 2 8 Sheet 18 S.W.G. , 2 10		Pipes (London) ton 108 5 0 Sheet (London) 106 0 0
Sheet 24 S.W.G 3 1	Condenser Plate (Na-	Tellurium Lead " £6 extra
Strip 10 S.W.G 2 88	val Brass) ,, 207 0 0 Wire 1b. 2 8	5 Nickel Silver
Strip 24 S.W.G 2 11		Sheet and Strip 1% ib. 3 94
Circles 22 S.W.G. , 3 2 Circles 18 S.W.G. , 3 1	Beryllium Copper	
Circles 12 S.W.G. ,, 3 0	Strip , 1 4 11	Phosphor Bronze Wire
Plate as rolled , 2 8	Rod	
Sections , 3 2 Wire 10 S.W.G , 2 11	, , , , , , , , , , , , , , , , , , , ,	Titanium (1,000 lb. lots) Billet over 4" dia18" dia. lb. 63/- 64/-
Tubes 1 in. o.d. 16	Copper	Rod 4" dia·250" dia. ,, 75/- 112/-
S.W.G 39 4 1	Tubes	
Aluminium Alloys	Strip ,, 280 0 0	Sheet 8' × 2' × ·250"-·010" 88/- 157/-
BS1470. HS10W. Sheet 10 S.W.G. 3 1	Plain Plates ,, — Locomotive Rods ,, —	Strip ·048"-·003", 100/- 350/- Tube, 300/-
Sheet 18 S.W.G. ,, 3 3	H.C. Wire , 301 5 0	Extrusions 120/-
Sheet 24 S.W.G. ,, 3 11		Zinc
Strip 10 S.W.G. ,, 3 1 Strip 18 S.W.G. ,, 3 21	Cupro Nickel	Sheet ton 106 12 6
Strip 24 S.W.G. ,, 3 10	Tubes 70/30 lb. 3 7	Strip nom.
BS1477. HP30M. Plate as rolled 2 11	D	
BS1470. HC15WP.	Domes	tic and Foreign
Sheet 10 S.W.G. ,, 3 91 Sheet 18 S.W.G. ,, 4 2		
Sheet 24 S.W.G. ,, 5 01	Merchants' average buying prices delivere	d, per ton, 7/4/59.
Strip 10 S.W.G. ,, 3 101 Strip 18 S.W.G. ,, 4 2	Aluminium New Cuttings	Gunmetal £
Strip 24 S.W.G. ,, 4 91	New Cuttings	
BS1477. HPC15WP. Plate heat treated. , 3 61	Segregated Turnings 96	
BS1475. HG10W.	Brass	Turnings 165
Wire 10 S.W.G. ,, 3 10½ BS1471. HT10WP.	Cuttings 165	
Tubes 1 in. o.d. 16	Rod Ends	
S.W.G	Light 124	Nichal
Sections 3 11	Rolled	Cuttings —
Brass	Turnings 139	
Tubes 1 11%	Copper	Phosphor Bronze
Brazed Tubes	Wire	
Sheet ton —	Firebox, cut up	103
Strip	Light 206	Zinc Pemelted 59
Extruded Bar (Pure	Cuttings	Remelted
Metal Basis) 19	Braziery 170	Old Zinc 37

Financial News

Delta Metal Company

In his report for 1958, the chairman of Delta Metal Company anticipated a reasonably successful year in 1959. The company's group trading profit for 1958 expanded from £1,858,714 to £2,720,021 and the profit, before tax, advanced from £1,533,107 to £2,114,909.

The profit includes a full year's return from James Booth and Co., and Sanbra, amounting to £363,000, before tax, compared with £67,000 for the part-year 1957. Profits from James Booth were adversely affected by Government defence

cuts, but development of alternative lines of production had produced a marked improvement.

The temporary setback has led to speeding-up in plans for development which should result in considerably increased productivity in the future.

Sanbra has amply fulfilled expectations and proved a useful and profitable addition to the growth of the province.

tion to the group.

Group net profit is £1,071,842 (£832,757) and the distribution is 31 per cent (30 per cent on smaller capital).

one-for-one scrip issue is proposed. Fixed assets appear at £9,691,465 (£9,099,697) and investments at £661,386 (£812,288). Current assets total £8,694,886 (£8,106,352), and current liabilities amount to £5,371,926 (£5,050,812). There are reserves of £9,056,640 (£8,703,250), and £1,027,000 (£658,073) is provided Commitments future tax. £341,000.

Ratcliffs (Great Bridge)

For 1958 the group net profit of Ratcliffs (Great Bridge) was £236,561 (£300,721) and dividend 10 per cent (same). Fixed assets totalled £1,038,023 (£884,051) and current assets amounted to £1,414,857 (£1,566,366). Current liabilities amounted to £243,337 (£387,009) and capital commitments to £160,000 (£260,000).

W. Williams and Sons (Holdings)

The group net profit for the year to December 28, 1958, of W. Williams and Sons (Holdings) Ltd. was £50,157 (£74,610), after tax of £48,701 (£39,900). An interim dividend of 5 per cent was declared (£5,750). Although no final dividend has been declared, a special

interim of 7 per cent is being paid in respect of the current year (6 per cent for the period June 28 to December 29, 1957, £6,900). To capital reserve ni (£52,878), forward £53,036 (£8,629). Fixed assets £167,119 (£141,451). Current assets £386,397 (£366,376), liabilities £154,946 (£146,439). Reserves £158,873 (£115,093). Future tax £39,697 (£46,295). Commitments £20,500 (£2,250). contraction may be experienced in profit for 1959 unless conditions improve.

The Consolidated Zinc Corporation Ltd.

The offer to Ordinary shareholders of The Consolidated Zinc Corporation Ltd. of 1,455,100 Ordinary shares at 48s. per share has been accepted to the extent of 1,417,685 shares, equivalent to 97.4 per

Metal Industries Ltd.

Metal Industries Limited, recently extended the closing date for its offer to purchase the whole of the share capital of Avo Limited, has announced that acceptances have now reached 99.7 per cent.

per cent. Final consideration for the acquisition will be £768,066 payable in cash and the issue of £240,967 new Ordinary stock in Metal Industries. This new issue will bring M.I.'s total issued capital to £6,140,967.

New Companies

The particulars of companies recently registered are quoted from the daily register compiled by Jordan and Sons Limited, Company Registration Agents, Chancery Lane, W.C.2.

Electrochemical Processes Limited (623122), Progress Works, Somers Road, E.17. Registered March 13, 1959. Nominal capital, £100 in £1 shares. Nominal capital, £100 in £1 shares. Directors: Robert J. Parker, David S. Parker, Joseph E. Parker, Lewis J. Parker, Montague H. Parker, John H. Nicholls and Ernest A. Glaysher.

Hard Chrome Platers (Leeds) Limited (623346), Savoy Works, 45 Bradford Road, Stanningley, Leeds. Registered March 17 1959. Nominal capital, £5,000 in £1 shares. Directors: Ernest Izett, Kenneth Izett and Denis R. Kennerly.

Scrap Metal Prices

The figures in brackets give the English equivalents in £1 per ton:-

Used copper wire	(£210.5.0)	240	Alum
Heavy copper	(£210.5.0)	240	clip
Light copper	(£175.5.0)	200	
Heavy brass	(£.113.17.6)	130	Alum
Light brass	(£92.0.0)	105	Lead,
Soft lead scrap	(£,57.0.0)	65	Lead,
Zinc scrap	(£.39.10.0)		Copp
Used aluminium un-			Copp
sorted	(£83.5.0)	95	Bronz
France (francs per kilo):			mad
Electrolytic copper			Bronz
scrap	(£198.15.0)	265	gun
Heavy copper	(£198.15.0)	265	Brass.
No. 1 copper wire	(£.187.10.0)	250	Brass,
Light brass	(£116.5.0)	155	Brass,
Zinc castings	(f.49.10.0)	66	New
Lead	(£.63.15.0)	85	pin
Aluminium	(£120.0.0)		Old z

West Germany (D-marks per 100 kilos): Italy (lire per kilo):

۰	ties per kilo).		
	Aluminium soft sheet clippings (new)	(£197.12.6)	335
	Aluminium copper alloy		
	Lead, soft, first quality	(£75.7.6)	
	Lead, battery plates	(£41.17.6)	71
	Copper, first grade	(£227.2.6)	385
	Copper, second grade	(£215.7.6)	365
	Bronze, first quality machinery	(£212.10.0)	360
	Bronze, commercial gunmetal	(£183.0.0)	310
	Brass, heavy	(£147.10.0)	250
	Brass, light	(£132.15.0)	
	Brass, bar turnings	(£135.15.0)	230
	New zinc sheet clip-		
	pings	£56.0.0)	95
	Old zinc	(£41.7.6)	70

Trade **Publications**

Oxygen Steelmaking. — Head Wrightson and Co. Ltd., Teesdale Ironworks, and Co. Ltd., T Thornaby-on-Tees.

This is an illustrated booklet of 28 pages which summarizes the immediate position with regard to the oxy-Thomas, L.-D. and Kaldo processes. The booklet opens with historical perspectives and concludes with the various services proyided by the company.

Glycerine Data Sheet. — The United Kingdom Glycerine Producers' Association Ltd., 5 Bridewell Place, London,

This new data sheet gives a useful summary of the physical properties of glycerine, including short tables showing specific gravity, freezing points, and vapour pressure/relative humidity data for different concentrations of glycerine in water. The sheet also describes the three principal grades of refined glycerine: chemically pure, technical grade, and dynamite grade.

Beryllium Copper Alloy. — Beryllium Smelting Company Limited, 36-38 Southampton Street, London, W.C.2. - Beryllium

A new four-page folder in colour deals with "Beryldur," a new and low-priced beryllium copper alloy which is being marketed in this country on behalf of the Beryllium Corporation of Pennsylvania, U.S.A. The development of this alloy, together with details of its uses, are set out with statistical data and illustrations.

Metals for Nuclear Energy. — Imperial Chemical Industries Limited, Metals Division, Birmingham.

A new booklet of 24 pages details the part which I.C.I. Metals Division, including the subsidiary, Marston Excelsior Ltd., played in the early days of nuclear engineering, and the intensive research and development work which it has subsequently carried out in this field, both as regards new forms of traditional as regatus new forms of traditions, and in the realms of the nuclear metals. There are also many diagrams and illustrations in this booklet, and the progress and development of the company's activities in the field of the new metals from 1940 onwards is described.

Efco-Udylite Review. — The Electro-Chemical Engineering Co. Ltd., Sheerwater, Woking, Surrey.

The current issue of this review includes further reports on some of the research and development work which is being carried out by Efco-Udylite dis-tributors. Notes on the new laboratories and the installation of an ultrasonic plant at Sheerwater are included, as well as details of some interesting orders received from abroad.

Reagents and Solvents. - Hopkin and Williams Ltd., Freshwater Road, Chadwell Heath, Essex.

Two little booklets have been issued by this company. One deals with their P.V.S. reagents, purified for volumetric standardization, and the other with "Spectrosol" solvents for absorption spectroscopy.

THE STOCK EXCHANGE

Very Active Conditions Continued But Markets Irregular Prior To Budget

ISSUED AMOUNT OF SHARE		NAME OF COMPANY	7	MIDDLE PRICE 7 APRIL + RISE—FALL		DIV. FOR PREV. YEAR	DIV. YIELD	HIGH 1	HIGH LOW		958 LOV
£	£				Per cent	Per cent					
4,435,792	1	Amalgamated Metal Corporation	27/-	+1/6	9	10	6 13 3	27/-	23/3	24/9	17/6
400,000	2/-	Anti-Attrition Metal	1/6		4	84	5 6 9	-	-	1/9	1/3
41,305,038	Stk. (£1)	Associated Electrical Industries		+2/6	15	15	5 4 3	59/-	54/-	58/9	46/6
1,609,032	1	Birfield	10.1	+6d.	15	15	6 5 0	59/-	47/6	62/4	46/3
3,196,667	1	Birmid Industries		+1/9	171	17#	4 14 6	76/104	72/-	77/6	55/3
5,630,344	Sek. (£1)	Mt. t. A C II A	201	+2/-	11	10	5 12 9	40/4	36/14	39/-	23/9
				+41-	5	5	6 3 0	16/3	15/-	16/14	14/7
203,150	Sek. (£1)	Ditto Cum. A. Pref. 5%			6	6	6 15 3	18/14	17/9	17/4	16/6
350,580	Stk. (£1)	Ditto Cum. B. Pref. 6%			10	124		28/3	27/6	28/9	
500,000	1	Bolton (Thos.) & Sons		d							24/-
300,000	1	Ditto Pref. 5%	1		5	5		15/6	15/-	16/-	15/-
160,000	1	Booth (James) & Co. Cum. Pref. 7%			7	7	6 16 6	40(7)	10/0	20/41	19/-
1,500,000	Sek. (£1)	British Aluminium Co. Pref. 6%			6	6	6 3 0	19/7	18/9	20/-	18/4
15,000,000	Sek. (£1)	British Insulated Callender's Cables	49/-	+9d.	124	121	5 2 0	53/-	47/6	52/6	38/9
17,047,166	Stk. (£1)	British Oxygen Co. Ltd., Ord	54/6		10	10	3 13 6	56/-	49/3	52/	28/3
600,000	Sek. (5/-)	Canning (W.) & Co	25/9	+41d.	25 + *2‡C	25	4 17 0	25/9	24/9	25/3	19/3
60,484	1/-	Carr (Chas.)	2/-		124	25	6 5 0	2/3	1/3	2/3	1/4
150,000	2/-	Case (Alfred) & Co. Ltd	5/-		25	25	10 0 0	5/3	4/71	5/3	4/-
555,000	1	Clifford (Chas.) Ltd	2011	d +4jd.	10	10	8 17 9	22/10	22/6	22/-	16/-
45,000	1	Ditto Cum. Pref. 6%	15/3		6	6	7 17 6	-	_	16/-	15/-
250,000	2/-	Coley Metals	****		20	25	11 17 0	3/44	2/10	4/6	2/6
8,730,596	1	Cons. Zinc Corp.†	44.14	—3d.	18}	221	6 2 0	67/6	60/6	65/3	41/-
1,509,528	1	Davy & United	001	+1/6	20	15	4 4 3	96/-	86/-	87/-	45/9
2,915,000	5/-	Delta Metal	24.10	+1/9	31	30	4 17 6	31/9	24/14	25/-	17/7
4,600,000	Sck. (£1)	Enfield Rolling Mills Ltd	****		15	12	6 9 0	48/-	36/74	38/-	22/9
750,000	1	Evered & Co	****	2 -110	10 §	15 Z	6 7 0	31/6	30/-	30/-	26/
18,000,000	Sek. (£1)	0 151 1 0		1 2/2	10P	124		40/3	30/9	40/6	29/6
1,500,000				+3/3	20	20	5 17 9	40/-	33/9	39/3	27/3
1.8-1-1-1-1-1	Sek. (10/-)	General Refractories Ltd		+3d.	15	15	4 13 6	66/6	64/-	67/6	61/-
401,240	1	Gibbons (Dudley) Ltd									
750,000	5/-	Glacier Metal Co. Ltd	6/9		111	111	8 10 3	7/1½	6/71	8/3	5/-
1,750,000	5/-	Glynwed Tubes	17/6		20	20	5 14 3	19/3	16/41	18/11	12/1
5,421,049	10/-	Goodlass Wall & Lead Industries	32/3	+1/6	13	18Z	4 0 6	32/3	28/71	30/9	17/3
342,195	1	Greenwood & Batley	79/6		20	17½	5 0 6	83/9	75/-	57/9	45/-
396,000	5/	Harrison (B'ham) Ord	18/71	+2/41	*171	*15	4 14 0	18/7 1	14/11#	15/9	11/6
150,000	1	Dicto Cum. Pref. 7%	19/6		7	7	7 3 6		_	19/9	18/4
1,075,167	5/-	Heenan Group	8/-		10	10:	6 5 0	8/3	7/6	9/71	6/9
6,958,260	Sek. (£1)	Imperial Chemical Industries	34/-	3d.	12Z	10	4 14 0	38/3	33/9	38/	24/3
14,736,773	Sek. (£1)	Ditto Cum, Pref. 5%	16/9	+3d.	5	5	5 19 6	16/104	16/-	17/11	16/-
4,584,025	**	International Nickel	1664	+14	\$2.60	\$3.75	2 15 9	171	153	169	132
860,000	5/-	Jenks (E. P.), Ltd	9/9	+6d.	14	2740	7 3 6	10/-	8/9	10/-	6/7
300,000	1	Johnson, Matthey & Co. Cum. Pref. 5%		,	5	5	6 3 0	16/3	15/44	16/9	15/-
3,987,435	1	Dicto Ord	47/-	-1/6	10	10	4 5 0	52/6	44/3	47/-	36/6
600,000	10/-	Keith, Blackman	27/6	70	174E	15	6 7 3	27/6	25/-	28/9	15/-
320,000	4/-	1 - 1 - 41 - 1-1 -		414	10	10	6 10 6	6/44	5/3	6/-	3/-
	1	** ** * * * * * * * * * * * * * * * * *	6/11	—1½d.	15	15	7 1 3	45/-	42/6	45/-	32/-
765,012	1	McKechnie Brothers Ord	42/6		15	15	7 10 0	43/6	40/-	45/-	30/-
1,530,024		Ditto A Ord	40/-			27+1					
1,108,268	5/-	Manganese Bronze & Brass	15/6		20			15/6	13/9	14/11	8/9
50,628	6/-	Ditto (7½% N.C. Pref.)	6/-		71	71	7 10 0	70/0	-	6/3	5/6
3,098,855	Sek (61)	Metal Box	78/9	+9d.	11	11	2 15 6	78/9	66/6	73/3	40/6
415,760	Stk. (2/-)	Metal Traders	9/9		50	50	10 5 3	9/9	8/41	9/-	6/3
160,000	1	Mint (The) Birmingham	23/-	+3d.	10	10	8 14 0	23/-	22/-	22/9	19/-
80,000	5	Ditto Pref. 6%	72/6		6	6	8 5 6	75/6	69/-	83/6	69/-
3,705,670	Sck. (£1)	Morgan Crucible A	45/6		10	10	4 8 0	45/9	43/6	45/	34/-
1,000,000	Sek. (£1)	Ditto 51% Cum. 1st Pref	17/6		51	51	6 5 9	18/6	17/6	18/-	17/-
2,200,000	Sck. (£1)	Murex	50/-	+4/-	171	20	7 0 0	50/-	42/-	58/9	46/-
468,000	5/-	Ratcliffs (Great Bridge)	10/9	+1+d.	1 OR	10	4 13 0	11/3	10/4	11/14	6/1
234,960	10/-	Sanderson Bros. & Newbould	30/-	+1/3	20	27±D	6 13 3	30/-	27/9	27/3	24/6
1,365,000	Sek. (5/-)	Serck	19/3	—3d.	15	171	3 18 0	19/6	18/-	18/7	11/-
5,698,586	Sek. (£1)	Stone-Platt Industries	45/3	+9d.	15	121	6 12 6	46/9	43/3	45/6	22/6
2,928.963	Sek. (£1)	Ditto 51% Cum. Pref	16/6	+4jd.	S.	54	6 13 3	16/71	15/104	16/3	12/7
9,255,218	Sek. (£1)	7 to be	83/-	+1/3	171	15	4 4 3	83/3	72/-	86/-	48/4
1,000,000	Sek. (£1)	Mr. L			10	10	6 1 3	37/-	30/6	36/3	28/9
			33/-	+1/41	5	5	6 15 6	15/0}	14/7	15/9	14/3
750,000	Sek. (£1)	Ditto Pref. 5%	14/9	161	*5	•5	7 0 3A				
6,863,807	Stk. (£1)	Ditto Pref. 5% tax free	22/-	+6d.				22/71	21/71	23/-	21/3
2,200,000	1	Ward (Thos. W.), Ord	87/6	+4/-	20	15	4 11 6	87/6	83/6	87/3	70/9
2,666,034	Stk. (£1)	Westinghouse Brake	43/-	+-6d.	10	10	4 13 0	47/-	39/9	46/6	32/6
225,000	2/-	Wolverhampton Die-Casting	10/41	—1½d.	30	25	5 15 9	10/6	8/8‡	10/14	7/-
591,000	5/-	Wolverhampton Metal	23/9	+1/-	271	271	5 15 9	23/9	21/6	22/9	14/9
78,465	2/6	Wright, Bindley & Gell	6/6		20	20	7 13 9	6/71	4/111	5/41	2/9
124,140	1	Ditto Cum, Pref. 6%	13/9	+11d.	6	6	8 14 6	13/9	13/6	13/-	11/3
150,000	1/-	Zinc Alloy Rust Proof			27	40D	9 0 0	3/-	2/9	3/11	2/7

*Dividend paid free of Income Tax. †Incorporating Zinc Corpn. & Imperial Smelting **Shares of no Par Value. ‡ and 100% Capitalized Issue. **Effective Properties of the Issue quoted in the third column. A Calculated on £7 14 6 gross. Y Calculated on 11½% dividend. ||Adjusted to allow for capitalization issue. E for 15 months. D and 50% capitalized issue. Z and 50% capitalized issue. B equivalent to 12½% on existing Ordinary Capital after 100% capitalized issue. A Calculated on 17½%. C Paid out of Capital Profits. E and 50% capitalized issue in 7%2nd Pref. Shares. P Interim dividend since reduced. § And Special distribution of 2½% free of tax. R And proposed 33½% capitalized issue in 8% Maximum Ordinary 5/- Stock Units.



Is that Bank Statement worrying you?

Many of our customers have found that they can stay "out of the red" by buying their Non-Ferrous Metals from our stocks in the exact quantities required, at the time they are needed and at MILL PRICES.

The advantages are many. Capital is no longer tied up in material that may not be used for weeks, or even months. Storage problems are a thing of the past, and there is no chance of being saddled with redundant stocks due to a change in design or demand.

We are Official Stockholders for I.C.I. (Metals Division) and all of our Stocks within the range they produce are of their manufacture. This ensures a high consistency of quality and temper so often lacking when purchasing from stockholding sources.

You cannot buy metal on hire purchase but you can use THE RIGHTON SERVICE. Why not pick up the telephone and try it Now?



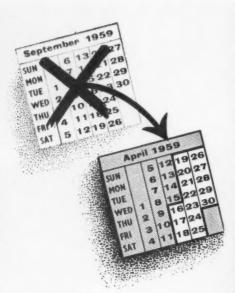
Henry Righton & co. LTD.

70-84 PENTONVILLE ROAD, LONDON, N.I

TELEPHONE: TERMINUS 8877

AND AT BIRMINGHAM & BRISTOL

* Send for a copy of our illustrated 44 page "Stock & Weights" Booklet



ENGINEERING marine, welding & nuclear energy EXHIBITION

The largest event of its kind in the world

If you are an Engineer - of whatever kind - this is YOUR Exhibition. In Olympia on a floor space of over a quarter of a million square feet, over 500 of the world's leading manufacturers will show their most up-to-date equipment for your benefit. This Exhibition has been internationally famous for over 50 years. It occurs only once every two years. Previously it has been held in September, but in 1959 for the first time it has been possible to meet the popular demand for the Exhibition to be staged in the Spring of the year.

OLYMPIA · LONDON APRIL 16th-30th, 1959

Opening hours: April 27th, 28th, 29th—10 a.m. to 8 p.m. ALL OTHER DAYS — 10 a.m. to 6 p.m. CLOSED SUNDAYS



ORGANISED BY F. W. BRIDGES & SONS LTD

Grand Buildings, Trafalgar Square, London, W.C.2, Tel: Whitehall 0568, 5 lines. For Aluminium Alloys

Pely always on the DECK

METAL CO. LTD.

128-132 SALTLEY ROAD, BIRMINGHAM 7

Telephone: ASTon Cross 1351-2





ROLLING MILL ENGINEERS AND HEAVY IRON FOUNDERS

Manufacturers of

ROLLING MILLS . SHEARS COILERS · INGOT MOULDS TURNTABLES

for the non-ferrous Metal Industry

GEORGE JONES LIMITED, LIONEL STREET FOUNDRY, BIRMINGHAM, 3.

Telephone: CENtral 1003-4



A (TI) COMPANY

(OLDBURY) LTD · OLDBURY BIRMINGHAM

Instant Control by Foot-operated Clutch.

Maximum width of Strip 18 inches.

Coiled Stock.

Telephone: BROADWELL 1294 (3 lines) Telegrams: "BRUX" OLDBURY



Manufacturing Range

PLATES Maximum Length 16 ft. Maximum Width 4 ft. 6 ins. Maximum Weight 12 cwts.

SHEETS Cold Rolled

Maximum Width ... 3 ft. 4 ins. Minimum Thickness ... 28 S.W.G.

Hot Rolled

Maximum Width ... 4 ft. 6 ins. Minimum Thickness 26 S.W.G.

STRIP Maximum Width 1 ft. 2 ins. Minimum Thickness 30 S.W.G.

For full particulars of the above and other products consult our reference book "Non-Ferrous Products." A copy will be sent on request.

VICKERS

VICKERS-ARMSTRONGS (ENGINEERS) LIMITED BLSWICK WORKS NEWCASTLE UPON TYNE 4



RAVEN HEAD

Telephone: St. Helens 2217/8

Telegrams: HELENA St. Helens

T. J. BROOKS & CO. (METALS) LTD.

Buyers of Scrap Metals

ALUMINIUM BRASS COPPER GUNMETAL
PHOSPHOR BRONZE . MANGANESE BRONZE
CONDENSER TUBES . OLD PROPELLERS
LEAD . WHITEMETALS

Works and Offices

CROW LANE, ROMFORD, ESSEX.

Telephone: ROMford 43113 ROMford 40447 Telegrams: Gobions, Romford

Leading Makers for over 35 years

ELECTRIC FURNACES

FOR ALL PURPOSES

In all heater grades

MOLYBDENUM
PLATINUM
SILICON-CARBIDE
KANTHAL
NICHROME

INSURANCE

ITSO°C

MUFFLE
ROTARY
CRUCIBLE
TROLLEY
CONTINUOUS
SPHERICAL
and in standard and and general airses

R. M. CATTERSON-SMITH LTD.

ADAMS BRIDGE WORKS - EXHIBITION GROUNDS - WEMBLEY Telephone: WEMbley 4291 Cables: Leckiln, Wembley



E. AUSTIN & SONS (LONDON) LIMITED · HACKNEY WICK, E.9 · Tel: AMHerst 2211

R. J. COLEY & SON (Hounslow) LTD

MILL FARM WORKS, HANWORTH RD., HOUNSLOW Tel. Hounslow 6136, 2266/7

R. J. COLEY & SON

(NORTHERN) LTD King Street, Dukinfield

Tel.: Ashton-U-Lyne 3664

Stoneygate, Preston

Tel: Preston 57621/2

. COLEY & SON

(BRISTOL) LTD

Deep Pit Road,

St. George, Bristol, 5

Tel.: Bristol 56307

R. J. COLEY & SON

(SWINDON) LTD

112 Oxford Road,

Stratton St. Margaret, Swindon Tel.: Stratton St. Margaret 2164



COLEY UTILITIES LTD

North Drive, Hounslow

Tel.: Hounslow 9720

H. A. FOSTER

(CHERTSEY) LTD

Mead Lane, Chertsey

Tel.: Chertsey 2196

"Members of the National Association of Non-Ferrous Scrap Metal Merchants."

METAL MERCHANTS



ENGELHARD INDUSTRIES, LTD.

BAKER PLATINUM DIVISION
52, High Holborn, London, W.C.1. CHAncery 8711.







& CO (GREENWICH) LTD .

ANCHOR IRON WHARF Tel. GREENWICH EAST GREENWICH S.E 10 3103/6

ONE OF THE FIRST SCRAP METAL MERCHANTS IN THE COUNTRY

Rate: Advertisements set in run-on style 4d. per word, minimum 4/-. Semi-displayed announcements are charged at 22/6 per inch depth. Box Numbers add 5 words, plus 1/- for registration and forwarding replies. "Copy" accepted at London Office up to 1st post on each Friday for the following Friday's issue.

METAL INDUSTRY CLASSIFIED ADVERTISEMENTS

Trade Discounts: Details upon application to "Metal Industry," Dorset House, Stamford Street, London, S.E.1. Remittances payable to liffe & Sons Ltd. The proprietors retain the right to refuse or withdraw "copy" at their discretion and accept no responsibility The for matters arising from clerical or printers' errors.

APPOINTMENTS VACANT

EXCELLENT opportunity for experienced Plating Equipment Engineer. The work is manufacture of automatic conveyors. A background of general knowledge of electroplating is necessary, and candidates must be able to work to existing designs as well as incorporate modifications. Commencing salary commensurate with qualifications and experience. Please write, giving full details of background, past experience, etc., to Box 2785, c/o Metal Industry. [7749]

APPOINTMENTS WANTED

EDUCATED Gentleman (36), several years' experience Shipping Dept. Metal Merchants, keen to obtain position buying department, metal consumers. Write Box 2864, c/o Metal Industry. [775]

CAPACITY AVAILABLE

SHEET Metal Work, Metal Spinning, Deep Drawn Pressings, Stamping Press capacity 200 tons. Max. draw 15". Enquiries or speci-fications to Wades (Halifax) Ltd., Arden Works, Fenton Road, Halifax)

KELLERING and Cam Profiling Capacity up to 8 ft.×6 ft., or 6 ft. diameter. ARMYTAGE BROS. (KNOTTINGLEY) Ltd., The Foundry, Knottingley, Yorkshire. Tel. Knottingley 2743/4.

HEAT TREATMENTS

HEAT Treatment. A.I.D. Approved, all wrought and cast Light Alloys. Large sizes a speciality. Electro Heat Treatments Ltd., Bull Lane, West Bromwich. Phone Wes 0756. [0005]

MATERIALS FOR SALE

For Sale Surplus to Requirements—Brand New Pure Aluminium Sheets,
Half Hard, 6 ft. × 3 ft.
25 Cwts. 25 gauge. 2s. 7½d. per lb.
25 Cwts. 21 gauge. 2s. 6½d. per lb.
4½ Tons 18 gauge. 2s. 5½d. per lb.
5 Tons 16/17 gauge. 2s. 5½d. per lb.
10 Tons 19/20 gauge 2s. 4½d. per lb.
Ltd., Willington, Derbyshire.

MATERIALS WANTED

W ANTED—New Aluminium Castings, excluding High Zinc Castings.
Clean Zinc Base Die-Castings.
New Cadmium Anodes.
New Nickel Anodes.
Offers to:— Offers

FOUNDRY METALS LTD.,

41 BOROUGH ROAD, KINGSTON-ON-THAMES, SURREY. Telephone: Kin. 9745/1598. [7731

MISCELLANEOUS

TRANSLATION. French, German, Spanish by experienced graduates. Technical and commercial correspondence, etc., promptly and accurately executed. Box 2881, c/o Metal 17752.

PLANT FOR SALE

ONE Birlee 10 kW 4" Continuous Belt Conveyor Furnace, temperature 1,150°C., automatic temperature control ONE Birlee 150 c.f.h. Town Gas Generator, for automatic control of above furnace. Can both be classified new, having had approximately one month's continuous work. Condition can be verified by manufacturers. £1,000. Box 2631, c/o Metal Industry. [7744]

SCRAP METAL (SALE & WANTED)

B. J. PERRY & CO. LTD.

Exchange Buildings, Birmingham, 2, for Phosphor Bronze Swarf and Scrap and all Non-Ferrous Metals.
Tel.: Midland 5986-7. [6] f0013 Melting Furnaces for All Metals

MONOMETER

MFG. CO. LTD

SAVOY HOUSE 115-116, STRAND LONDON, W.C.2

NEW PRODUCTS DEVELOPMENT

A large industrial organization investigating and carrying out market research on piping invites applications from men experienced in the selling and distribution of steel and iron pipes. The applicants must have considerable knowledge in this field, and it is preferred that they should also have some knowledge of the building trade. Good salary and prospects offered to the right man. Write giving full details of education, qualifications obtained in this field, career to date and salaries earned, to Box FM.160, c/o Central News Ltd., Pemberton House, East Harding Street, London, E.C.4.

SCRAP METAL (SALE & WANTED)

URGENTLY REQUIRED

ZINC BASE ALLOY SCRAP

clean or contaminated

TURNINGS AND SKIMMINGS

MITCHAM SMELTERS LTD

REDHOUSE ROAD, MITCHAM ROAD, CROYDON, SURREY. 10008

NICKEL and High Nickel Content Scrap wanted. "Nimonics," "Inconel," "Monel," etc. Offer for best prices to Nicholson & Rhodes Ltd., Princess St., Sheffield, 4. Phone 27491. [0011

TIME RECORDERS

PACTORY Time Recorders. Rental Service.
Phone Hop. 2239. Time Recorder Supply and Maintenance Co. Ltd., 157-159 Borough High Street, S.E.I.

BOOKS

METALS and Alloys. Fifth Edition. This book contains approximately 4,600 compositions of non-ferrous alloy. It is mainly a list of alloys having definite names, including proprietary alloys, and is indispensable to users of non-ferrous metals and alloys in any industry. I5s. net from all bookseilers. By post 16s. from Illiffe & Sons Ltd., Dorset House, Stamford Street, London, S.E.1.

INDUSTRIAL Brazing. By H. R. Brooker and E. V. Beatson, B.Sc.(Eng.), A.M.I.E.E. The first full-length study of this subject. Covers in detail all modern brazing methods, including tarch, furnace, high-frequency induction, resistance, salt bath and dip, with chapters on the special techniques necessary for aluminium, stain less steels, beryllium copper, cemented carbides and vacuum tube construction. 35s. net from all booksellers. By post 36s. 6d from The Publishing Dept., Dorset House, Stamford Street, London, S.E.i.

HANDBOOK of Industrial Electroplating.

Second Edition. By E. A. Ollard, A.R.C.S.,

F.R.I.C., F.I.M., and E. B. Smith. Facts, figures
and formulae for all who design, erect, maintain or
operate electrodeposition plant, and for laboratory
workers who deal with plating solutions. Includes
sections on water and drainage, purification of
solutions, safety precautions and ventilation in
plating shops, and the special problems of costing
in such shops. 35s. net from all booksellers.
By post 36s. 5d. from lilifie & Sons Ltd., Dorset
House, Stamford Street, London, S.E.I.

STEELS in Modern Industry: A Comprehensive Survey by 29 Specialist Contributors. General Editor W. E. Benbow. An invaluable guide for engineers, designers and draughtsmen; it specifies the steels best used in various engineering applications (bearing in mind the present need for economy), describes their general and special properties and characteristics, and how they may be surface finished for anti-corrosive and other purposes. 42s. net from all booksellers. By post 43s. 9d. from The Publishing Dept., Dorset House, Stamford Street, London, S.E.1.

METALLURGICAL Progress, 2 & 3. One of the most time-consuming tasks for the more advanced metallurgical student and research worker is "searching the literature." In these critical reviews, members of the staff of The Royal Technical College, Glasgow, not only review the existing work to date, but also discuss its relative value, so making their survey infinitely more valuable. As in the second series of critical reviews, the third volume presents a reasoned survey of the current state of research knowledge on various aspects of metallurgy. Seven articles by leading authorities present the information in concise, easily readable form 6s. post free. Series II, 4s. 6d. post free. Obtainable from leading booksellers, or direct from Illife and Sons Limited, Dorset House, Stamford Street, London, S.E.1.

MATERIAL Handling in Works Stores. 2nd Edition. By L. J. Hoefkens. Shows how the use of fork-lift trucks and pallets in industrial stores can increase production, utilize floor space more effectively, help control of movement and reduce costs. Includes a description of a system actually operated in a modern factory. 18s. 0d. net from all booksellers. By post 19s. 0d. from The Publishing Dept., Dorset House, Stamford Street, London, S.E.1.

OXYGEN Cutting: A Comprehensive Study of Modern Practice in Manual and Machine Cutting. By E. Seymour Semper, M.I.Mech.B., M.Inst.W. Written to assist engineers concerned with cutting and shaping material, this book describes many of the machines designed for various applications of oxygen cutting to template with multiple heads and also the actual methods of operation. Price 10s. 6d. net. By post 11s. 4d. From all booksellers or from The Publishing Dept., Dorset House, Stamford Street, London, S.E.1.

G AS Welding and Cutting: A Practical Guide to the Best Techniques. By C. G. Baimbridge, M.I.Mech.E., M.Inst.W. A comprehensive text-book providing practical information on almost the whole range of available gas welding and cutting equipment, methods and processes. Invaluable to the practical welder as well as to those responsible for gas welding and cutting operations involved in the fabrication and repair of industrial equipment. Price 15s. net. By post 16s. 0d. From all booksellers or from The Publishing Dept., Dorset House, Stamford Street, London, S.E.1.

Page	Page	Pas
Austin & Sons (London) Ltd., E 17 Auxiliary Rolling Machinery Ltd., Inside front cover	Engers Ltd., M. C Inside back cover Engineering, Marine, Welding & Nuclear Energy Exhibition	Newton Collins Ltd. Inside front cover Nickel Anodes & Non-Ferreous Castings Ltd.
Birkett, T. M., Billington & Newton Ltd Outside front cover	Farmer-Norton & Co. Ltd., Sir James 4 Frost Ltd., N. T 20	Platt Metals Ltd 1
Brooke (Oldbury) Ltd	Garnham & Sons Ltd., J. B	Righton & Co. Ltd., Henry
Camelinat & Co. Ltd., E 6 Canning & Co. Ltd., W 6, 18	Hilger & Watts Ltd 3	St. Helens Smelting Co. Ltd
Catterson-Smith Ltd., R. M 16 City Casting & Metal Co. Ltd 14 Coley & Son (Hounslow) Ltd., R. J. 17	Imperial Chemical Industries Ltd 5	Stein & Atkinson Ltd.
Consolidated Zinc Corporation (Sales) Ltd	Jackson, E. W., & Son Ltd 18 Jones, George, Ltd 15	Vickers-Armstrongs Ltd.
		Wolverhampton Die Casting Co. Ltd
Electro-Chemical Engineering Co. Ltd. Outside back cover	Marshall-Richards Machine Co. Ltd. Ins:de back cover	
Engelhard Industries Ltd 18	Monometer Manufacturing Co. Ltd 19	Young Ltd., T. W Inside back cove



ERECTION OF CONSTRUCTIONAL STEELWORK

for students and junior site engineers

BY THOMAS BARRON A.M.I.STRUCT.E., A.M.INST.W.

A text-book Here is a thoroughly practical text-book covering every stage of operations in the erection of steelwork for buildings and bridges. Containing photographs, tables and a large number of the author's own drawings, this companion volume to CONSTRUCTIONAL STEELWORK SHOP PRACTICE has been produced under the direction of the British Constructional Steelwork Association. The author is widely experienced in steelwork erection and in dealing with the many particular problems involved. By special arrangement with the B.C.S.A. the price has been kept down to that of its companion volume in spite of the greater number of pages and the increase in printing costs. It is thus well within reach of students and junior site engineers for whom it is primarily intended.

from leading booksellers $8\frac{3}{4}$ " \times $5\frac{1}{4}$ " 240 pp. illustrated

15s net by 16s 1d

Published by ILIFFE AND SONS LIMITED . DORSET HOUSE . STAMFORD ST. . LONDON . S.E.1



MARSHALL

NEW ROLLING MILL

Combines PRECISION, VERSATILITY, COMPACTNESS, MODERATE COST

MODEL 4053 is the newest and finest Precision Rolling Mill engineered especially for permit a complete range of reductions in both hot and cold rolling. Write for complete specifications.

metallurgical and research laboratories in industry and colleges . . . or for a production mill in many applications. Extremely flexible it can be used as (1) a two-high, (2) a four-high with work rolls driven, and (3) a four-high with back-up rolls driven. This unique threeway driven, and a full line of accessories,



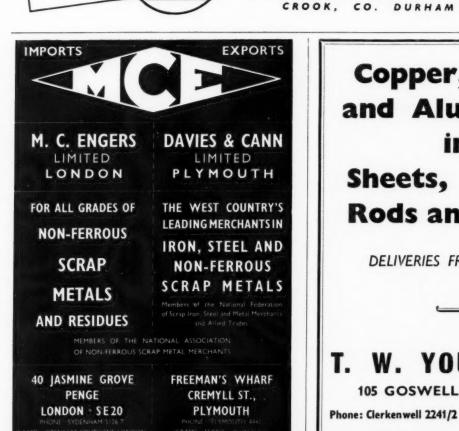








METALS RICHARDS MACHINE CO. LIMITED



Copper, Brass and Aluminium Sheets, Tubes, Rods and Wire

DELIVERIES FROM STOCK

W. YOUNG LTD.

105 GOSWELL ROAD, E.C.1

Phone: Clerkenwell 2241/2 Grams: Wuzog, Barb.

Efco-Udylite

BRIGHT NICKEL

Greater output from existing equipment.

The Efco-Udylite 66 Bright Nickel solution is air agitated and employs a new brightener system. The average cathode current density at which the solution can be operated is 100 amp/sq. ft., permitting greater outputs than with processes at conventional current densities.

Improved ductility

The 66 solution produces deposits of good ductility; there is no need for batch organic purification treatments which other solutions require.

Wide bright plating range

The 66 solution has an extremely wide bright plating range. It is very suitable for plating components of steel, cast iron, copper or brass.

Good "Levelling" action

This new Efco-Udylite Bright Nickel Plating Process has exceptionally good 'levelling' or line filling properties.

Excellent chromium coverage . . .

SEND FOR BROCHURE
"AUTOMATION & ELECTROPLATING"

See **STAND H.26**FACTORY EQUIPMENT EXHIBITION EARLS COURT. APRIL 7—17th

Due to the nature of the addition agents and to the fact that organic impurities are removed by continuous filtration through a carbon pack, outstanding chromium coverage of recessed areas is obtained.



ELECTRO-CHEMICAL ENGINEERING CO. LTD.

FORSYTH ROAD, SHEERWATER INDUSTRIAL ESTATE, WOKING, SURREY. Woking 5222/7